CANADIAN GEOGRAPHICAL JOURNAL

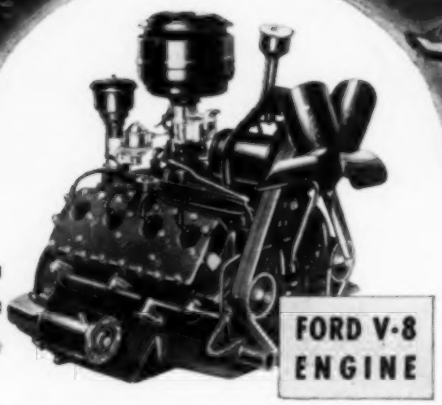
JULY
1944

VOL. XXIX
No. 1

$3.00 A YEAR

35c A COPY

The FORD V-8 ENGINE CAN TAKE IT!



FORD PRODUCTS are doing a job over there. The Ford car carries army staffs to vital parts of a fast changing front, and stands up under the punishment of war-torn roads. Rugged Ford trucks lug ammunition up to the guns; hurry food and supplies to forward positions; bring fuel from the beach-head to our flying fields.

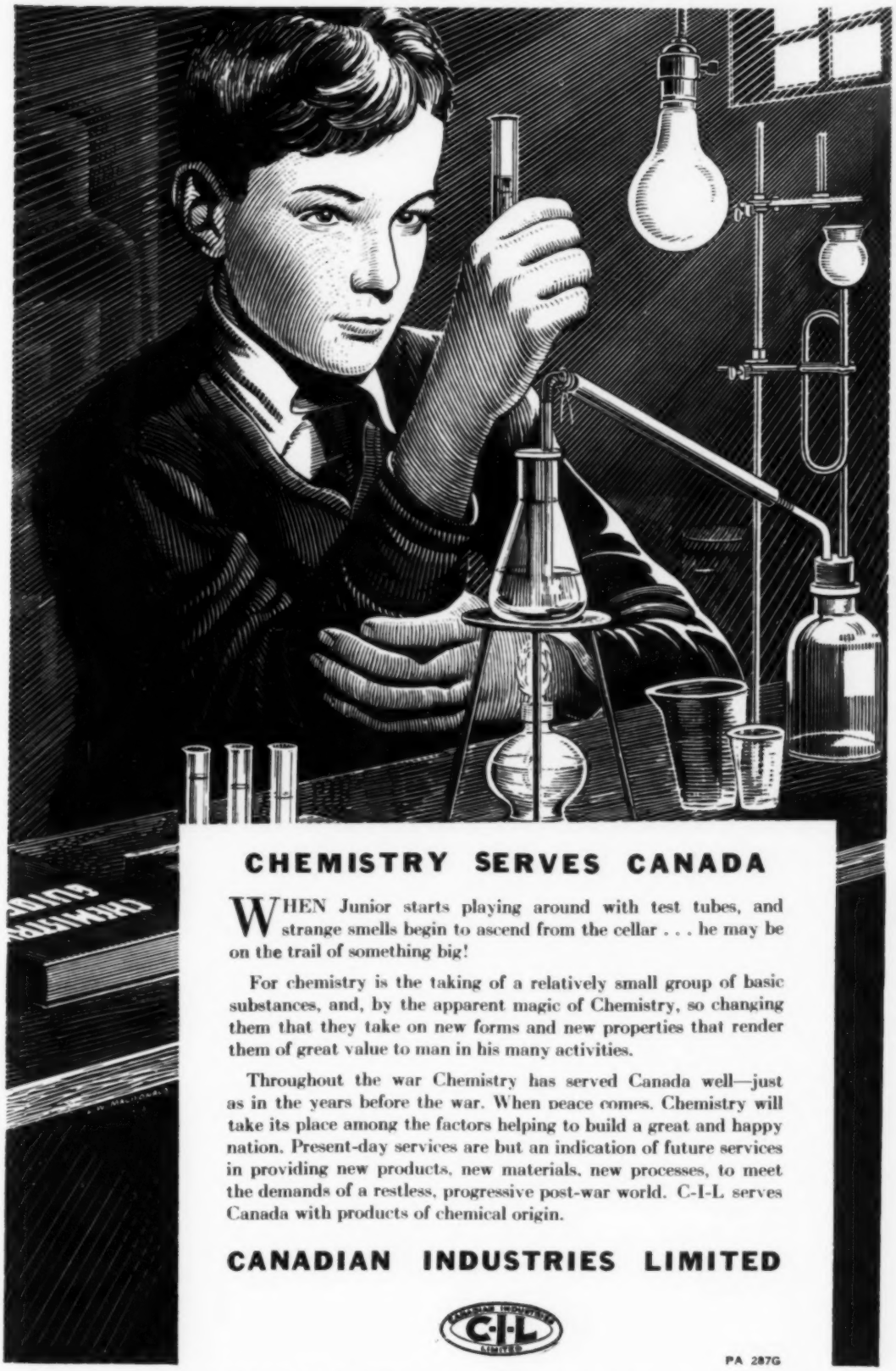
Ford products are doing a job on the home front, too. Ford cars carry war workers to and from vital jobs. Ford trucks transport raw materials and war equipment quickly and dependably.

The power plant behind this vast transportation task at home and overseas is the Ford V-8 engine. Week after week, under the toughest conditions war has to offer, it carries on smoothly, silently, economically and asks for little pampering.

The Ford V-8 engine is the power plant in more than 300,000 vehicles that have already gone out to the war zones in various parts of the world. It's the dependable kind of engine you'll want in your post-war car.

FORD MOTOR COMPANY OF CANADA, LIMITE

FORD V-8 AND MERCURY CARS FORD TRUCKS, FARM TRACTORS, BUSES



CHEMISTRY SERVES CANADA

WHEN Junior starts playing around with test tubes, and strange smells begin to ascend from the cellar . . . he may be on the trail of something big!

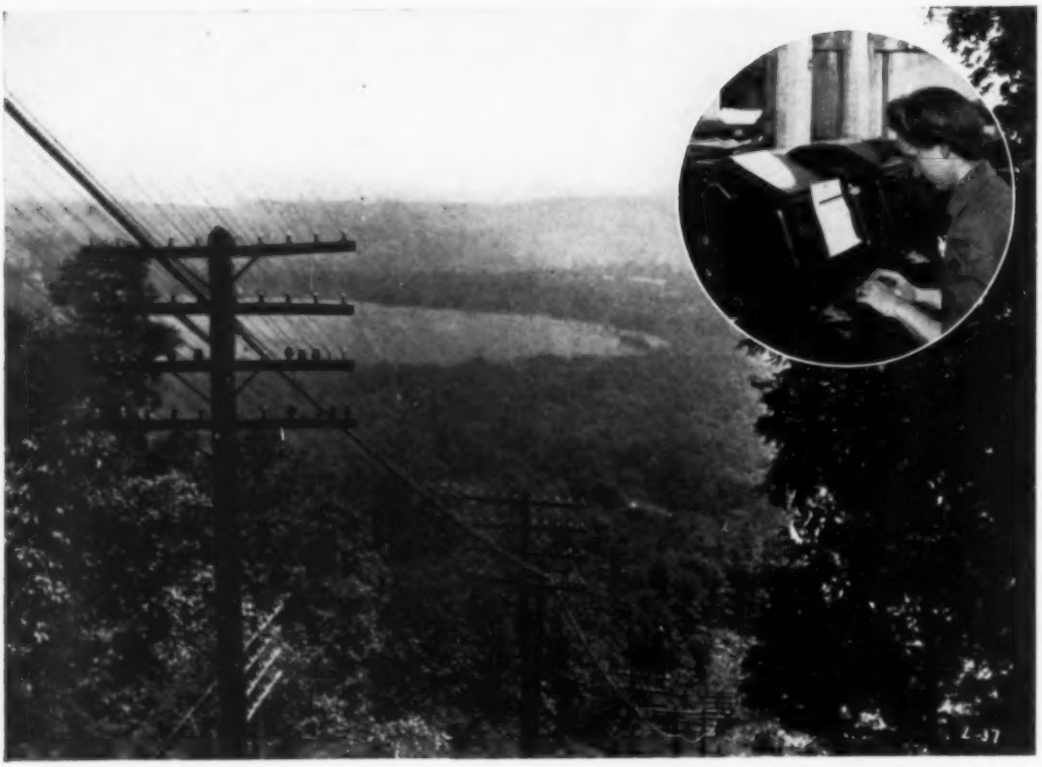
For chemistry is the taking of a relatively small group of basic substances, and, by the apparent magic of Chemistry, so changing them that they take on new forms and new properties that render them of great value to man in his many activities.

Throughout the war Chemistry has served Canada well—just as in the years before the war. When peace comes, Chemistry will take its place among the factors helping to build a great and happy nation. Present-day services are but an indication of future services in providing new products, new materials, new processes, to meet the demands of a restless, progressive post-war world. C-I-L serves Canada with products of chemical origin.

CANADIAN INDUSTRIES LIMITED

C-I-L

PA 287G



In both cables and wires, telegraph as well as telephone messages can be transmitted simultaneously, neither interfering with the other. This affords great economies in telephone and telegraph operation. (Inset):—Among the uses of telegraph circuits provided over telephone lines is teletype service, needed by large war organizations for the swift transmission of written orders. *Ford Motor Company photo*

HOW TELEGRAMS TRAVEL BY TELEPHONE WIRE

Two Anniversaries Bring Out Connection Between Telegraph and Telephone

This year marks the 100th anniversary of Samuel F. B. Morse's historic telegraph message, "What hath God wrought!", which took place on May 24, 1844. It is also the 70th anniversary of Alexander Graham Bell's invention of the telephone.

These two events bring out a connection between telegraphy and telephony which has existed since the early days of the latter, and which is even more marked at the present day.

Over the same wires which are humming with telephone conversations, telegraph signals are flashing at the same moment! The telephone channels are also telegraph channels which may be put to various commercial uses, such as the teletype-writers needed by many war organizations for the swift transmission of written orders and requisitions of supplies.

There is a close historical relationship between the telegraph and the telephone. In the first telephone patent, the new invention is described as "an improvement in telegraphy". It was while trying to develop a means of sending several Morse messages over the same wire at the same time that Alexander Graham Bell hit upon the fundamental principle of the telephone, and incidentally showed the way to the modern method of transmitting telegraph and telephone messages over the same circuit, all at the same time.

It was at Brantford, Ontario, in the summer of 1874, that Bell outlined to his father the idea that a current of electricity could be made to vary in intensity just as the air varies in density during the production of a sound. In the original telegraph, the current was made and broken each time a signal was sent. Bell's idea was that the current should be continuous, and that the signals should be sent by making it now stronger, now weaker.

On June 2, 1875, he heard over the wire the twang of a steel reed that formed part of his harmonic telegraph equipment. This convinced him that his theory was correct. If the current could vary with the vibrations of a reed, it could vary with other sound vibrations, including that of the human voice.

Telegraph signals are sent by interrupting or reversing a direct current flowing over a wire. This opening or closing, or alternation of direction, usually never takes place more frequently than 30 times per second.

On the other hand, the sounds of speech which are transmitted over a telephone alternate from 200 to 3,000 times per second. Telephone and telegraph currents, therefore, are altogether different in frequency. If they are transmitted over the same wire at the same time, neither will interfere with the other, and, at the receiving end, each will operate its own piece of equipment.

But this is not all! Wires can carry frequencies much higher than 3,000 cycles per second. Telegraph or telephone signals can be superimposed on these high frequency currents, and, at the end of the line, they can be "stepped down" again to the right frequency to operate a telegraph sounder or a telephone receiver.

One system of this type permits no less than 12 telephone conversations, or 108 telegraph messages to be sent over a single pair of wires in cable at the same time. Using open wires, not bound up in cable form, as many as 263 telegraph circuits can be obtained from one pair of wires!

CANADIAN GEOGRAPHICAL JOURNAL

Published monthly by
The Canadian Geographical Society
49 Metcalfe Street, Ottawa

Editor – *Gordon M. Dallyn*

This magazine is dedicated to the interpretation, in authentic and popular form, with extensive illustrations, of geography in its widest sense, first of Canada, then of the rest of the British Commonwealth and other parts of the world in which Canada has special interest.

Contents

JULY 1944 VOLUME XXIX No. 1

COVER SUBJECT:—"YOUNG FISHERMEN", by C. M. JOHNSTON, Ottawa

	PAGE
HOW THE GEOPOLITICIAN LOOKS AT OUR WORLD by RICHARD REDLER	4
BURNHAM BEECHES AND STOKE POGES by J. D. U. WARD	10
QUEBEC, A MINERAL STORE by A. O. DUFRESNE	12
DIAMONDS FOR VICTORY by E. R. YARHAM	27
THROUGH OLD ENGLAND'S COUNTRYSIDE by J. D. U. WARD	32
AGRICULTURAL LANDS IN THE CANADIAN NORTHWEST by E. S. ARCHIBALD	40
EDITOR'S NOTE-BOOK	V
AMONGST THE NEW BOOKS	VI

• • • •

The articles in this Journal are indexed in the *Reader's Guide to Periodical Literature* and the *Canadian Periodical Index* which may be found in any public library.

The British standard of spelling is adopted substantially as used by the Dominion Government and taught in most Canadian schools, the precise authority being the Oxford Dictionary as edited in 1936.

Contents of this Journal are copyright.

Address all communications regarding change of address, non-delivery of Journal, etc., to the publication office, 2151 Ontario Street, East, Montreal, Canada, giving old and new address. On all new memberships, the expiry date will be printed on wrapper containing starting number. This will constitute a receipt for subscription.

Membership in The Canadian Geographical Society is $3.00 per year in Canada and other parts of the British Empire, which includes delivery of the Journal, postpaid; in United States, Mexico, France, Spain, Central and South America, $3.50; in other countries, $4.00. Make membership fee payable at par in Ottawa.

Member Audit Bureau of Circulations.

Special Representatives:

Ontario: F. A. Dallyn, 21 King Street, E., Toronto, (Tel. EL. 2863)
Quebec: F. A. Dallyn, 2151 Ontario Street E., Montreal, (Tel. FR. 1722)
Europe: Norah C. Perry, 5 Upper Dagnall Street, St. Albans, Herts., England

Entered as second-class matter at the Post Office, Montreal, Canada.

PRINTED IN CANADA

The Canadian Geographical Society

OTTAWA CANADA

HONORARY PATRON

His Excellency Major-General the Earl of Athlone,
K.G., P.C., G.C.B., G.M.M.G., G.C.V.O., D.S.O.

CHARLES CAMSELL, C.M.G., B.A., LL.D.,
B. TYRRELL, M.A., LL.D., F.G.S., } Honorary Presidents

BOARD OF DIRECTORS

CHARLES G. COWAN, President

LT.-GEN. A. G. L. MCNAUGHTON, Vice-President
Hon. W. A. BUCHANAN, Vice-President
R. C. WALLACE, Vice-President
Hon. A. E. ARSENAULT, Assistant Judge, Supreme Court, Charlottetown, P.E.I.
MARIUS BARBEAU, National Museum of Canada, Ottawa
ARTHUR BEAUCHESNE, Clerk of the House of Commons, Ottawa
LAWRENCE J. BURPEE, Secretary for Canada, International Joint Commission, Ottawa
CHARLES CAMSELL, Deputy Minister, Department of Mines and Resources, Ottawa
COL. A. F. DUGUID, Director, Historical Section, Dept. of National Defence, Ottawa
MAJ.-GEN. W. W. FOSTER, Vancouver, B.C.
AUGUSTIN FRIGON, Montreal, P.Q.
K. A. GREENE, Ottawa
GILBERT LABINE, Toronto, Ont.
J. A. WILSON, Vice-President
O. M. BIGGAR, K.C., Honorary Counsel
K. G. CHIPMAN, Honorary Treasurer
E. S. MARTINDALE, Honorary Secretary
F. C. C. LYNCH, Department of Mines and Resources, Ottawa
B. R. MACKAY, Department of Mines and Resources, Ottawa
LT.-COL. L. T. MARTIN, Ottawa
Dean C. J. MACKENZIE, Acting President of National Research Council, Ottawa
LT.-COL. SIDNEY C. OLAND, Halifax, N.S.
F. H. PETERS, Surveyor-General of Canada, Ottawa
H. M. SNYDER, Sundre, Alta.
E. J. TARR, K.C., Winnipeg, Man.
GRIFFITH TAYLOR, University of Toronto, Toronto, Ont.
Hon. T. VIEN, Speaker of the Senate, Ottawa
J. C. WEBSTER, Shediac, N.B.

Editorial Committee

F. C. C. LYNCH, Ottawa, *Chairman*
F. D. L. SMITH, Toronto
Hon. W. A. BUCHANAN, Lethbridge
H. L. TRUEMAN, Ottawa
Hon. A. E. ARSENAULT, Charlottetown
LT.-COL. G. L. P. GRANT-SUTTIE, Toronto
M. Y. WILLIAMS, Vancouver
D. C. HARVEY, Halifax
J. C. WEBSTER, Shediac
F. J. ALCOCK, Ottawa
ROBERT ENGLAND, Ottawa
JAMES SPENCE, London, England
GORDON M. DALLYN, *Secretary*
W. EGGLESTON, Ottawa
A. B. WATT, Edmonton
OLIVER MASTER, Ottawa
GEORGE W. BROWN, Toronto
R. J. C. STEAD, Ottawa

Executive Secretary and Editor
GORDON M. DALLYN

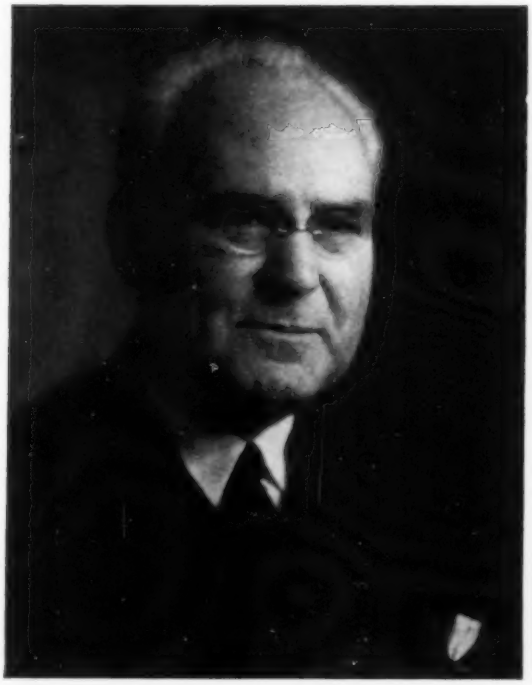
Auditors
DAVIS, BOYCE & COMPANY
Chartered Accountants

The Society's ambition is to make itself a real force in advancing geographical knowledge, and in disseminating information on the geography, resources and people of Canada. In short, its aim is to make Canada better known to Canadians and to the rest of the world.

As one of its major activities in carrying out its purpose, the Society publishes a monthly magazine, the Canadian Geographical Journal, which is devoted to every phase of geography—historical, physical and economic—first of Canada, then of the British Empire and of the other parts of the world in which Canada has special interest. It is the intention to publish articles in this magazine that will be popular in character, easily read, well illustrated and educational to the young, as well as informative to the adult.

The Canadian Geographical Journal will be sent to each member of the Society in good standing. Membership in the Society is open to any one interested in geographical matters. The annual fee for membership is three dollars in Canada.

The Society has no political or other sectional associations, and is responsible only to its members. All money received is used in producing the Canadian Geographical Journal and in carrying on such other activities for the advancement of geographical knowledge as funds of the Society may permit.



CHARLES G. COWAN
President
of
The Canadian Geographical
Society

Photo by Karsh

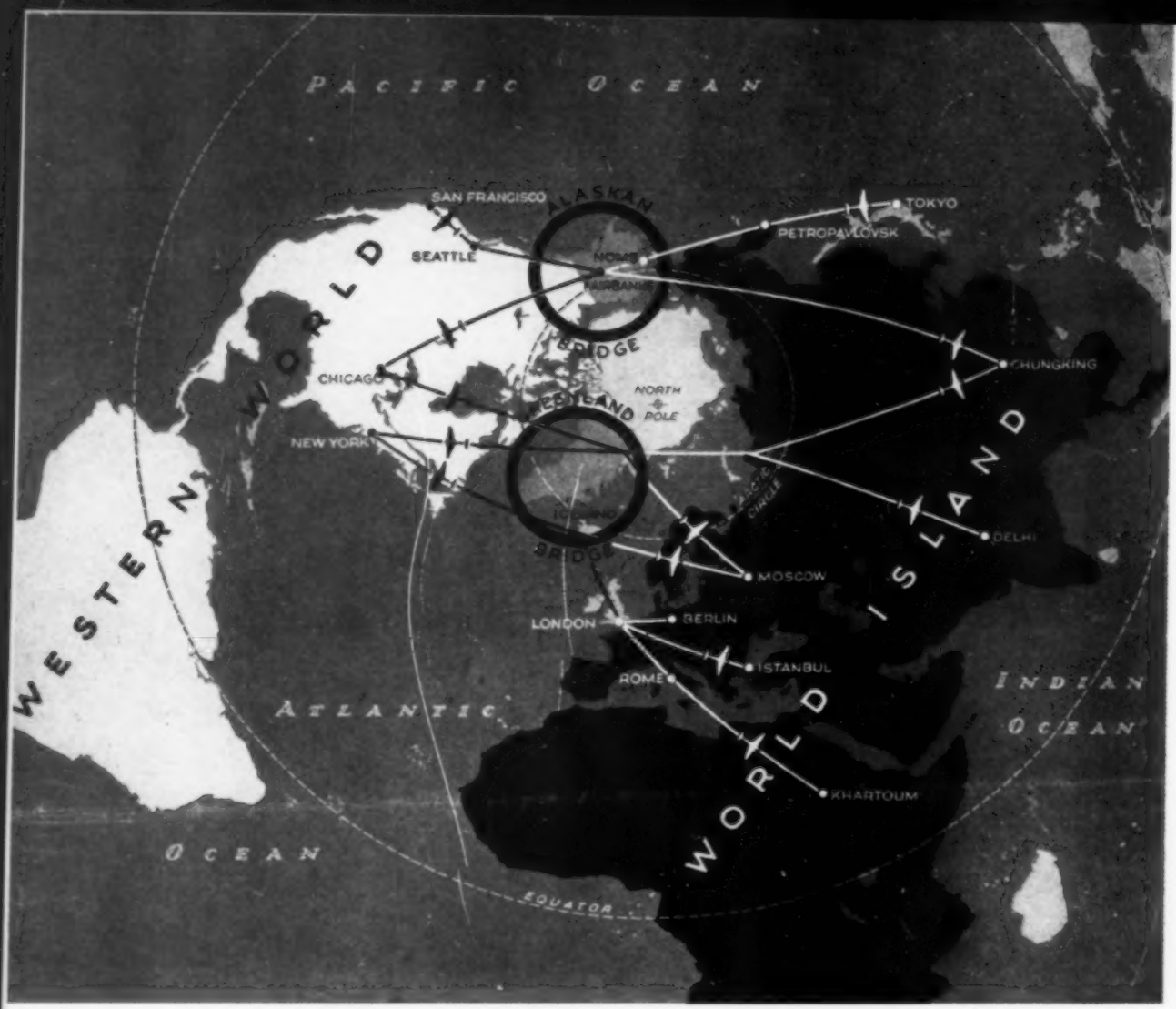
AT a meeting of the Directors held on May 17, 1944, Mr. Charles G. Cowan of Ottawa, Vice-President, was unanimously chosen to act as President of The Canadian Geographical Society for the unexpired term of the late Dr. George J. Desbarats, C.M.G., D.A.Sc.

Mr. Cowan was one of a group of business men who were asked, on the organization of the Society in 1929, to serve on the Board of Directors, and he was chosen Vice-President at that time—a position which he has continuously occupied ever since.

As Vice-President and Managing Director of the British American Bank Note Company Limited, Ottawa, Mr. Cowan is well known in business circles. He has also served in many public capacities, having been associated for some years in the direction of the Canadian Clubs. Through this connection he was called upon in 1927 to become Honorary Secretary of the National Diamond Jubilee Celebration of Confederation.

Mr. Cowan's connection with the First Aid movement dates back to 1917 when he became Honorary Secretary of the St. John Ambulance Association. Later he became President and served for four years in that capacity. He is still a member of the Ambulance Committee of the Association.

In the field of documentary films Mr. Cowan has taken a great interest since 1935 when he became Vice-President of the newly organized National Film Society of Canada, a position he still holds. On the organization of the National Film Board in 1939, Mr. Cowan was appointed a member by the Government of the day, and, on the expiration of his term in 1942, he was reappointed for another three years.



An air view, centred on the North Pole, shows a very different picture of the world from that of the European geopoliticians. The land masses of the globe centre around the polar ice cap, making the Arctic Ocean a Mediterranean Sea. Instead of being separated across thousands of water miles, the Western World is closely connected with the World Island by the "bridges" of Alaska and Greenland. Just as the Mercator map distorts the polar regions, this projection distorts the land around the edges but accurately shows the land in the centre. New air routes of the north shown above make this map vitally important for the future. The air age calls for a whole new system of geopolitics which has yet to be formulated by experts.

Courtesy of *Life*

How The Geopolitician Looks at Our World

by **RICHARD REDLER**

> "It is evident that the element of physical geography involved in the foundation of States has not been sufficiently emphasized, while the ethnological element has been too strongly pronounced. In fact, in much of the discussion it has been regarded as the determining, if not the sole factor in their proper construction, while, as a matter of history, the other elements have always played a larger role."

THIS observation of Professor John W. Burgess in his standard book *Foundations of Political Science*, written in 1917 in the middle of World War I, anticipates one of the most common criticisms of the work of the Paris Peace Conference, where geographic considerations ranked so far behind those concerning self-determination

and where some of the peace-makers almost prided themselves on their ignorance in the matter of geography.

"World geography" has always been a romantic favourite amongst the subjects of learning in densely populated continental Europe. Perhaps because space was so scarce and precious? Between the two wars a new branch of geography developed under the name of geopolitics.

Clearly, to people in the Americas, where space was abundant and the "frontier" seemingly endless, the worry about strategic borders, the bitter struggle for small parcels of land, did not make sense; geopolitics, to Americans, was an utterly unholy science.

World War II is radically changing this attitude. A book such as Nicholas J. Spykman's *America's Strategies in World-Politics* which "projects the special problem of the United States against the general experience of states and the nature of international relations, and offers an analysis of the position of our country in terms of geography and power politics" drives home the point that geography, just as it was dictating politics in Europe, is dictating American politics. The security of the western hemisphere has become a function of the balance of power on other continents.

The discovery of geopolitics as a new branch of science is wrongly attributed to the Nazis. In fact, only the term geopolitics itself was invented by General Haushofer. Long before he established his "Institute of Geopolitik" in Munich, English geographers applied themselves in scientific research to the problems of space and power. Mention might be made here of the late Lord Curzon, the geographer, who, as Viceroy of India, traced the northern frontier of that Empire according to his geopolitical theories, and whose projected border-line between Poland and Russia lately has gained fame. The English geographer, Sir Halford Mackinder, may be regarded as the real founder of geopolitics as a discipline of science. All the fundamental notions of the Haushofer school are already embodied in his small publication, *The Geographical Pivot of History*, which appeared in 1907. And his *Democratic Ideals and Realities*, published in 1918, is a valuable textbook, the new (1942) edition of which serves a useful purpose. The Nazis have taken over wholesale Mackinder's attractive new terminology of "World Island", "Heartland", "Crescents", "Mediterraneans", etc.; his definitions form the only solid substance of their writings.*

Mackinder's world is best seen on this flat Mercator map. The World Island consists of a Heartland surrounded by a rim of Coastlands. Beyond them lie outer islands. Mackinder warned that if any great power should gain control of the Heartland it could conquer the Coastlands. Then, by outbuilding the outer lands in sea power, it could gain control of the whole world.

Courtesy of *Life*

*One of the most valuable contributions of the geopoliticians to our knowledge of the world derives from their maps and charts which in their varying projections bring home to us the real proportions of the world, which are so badly distorted in our minds owing to the almost exclusive application of the Mercator projection in our schoolbooks. One of the most usual and simplest is the polar projection of which the reader will find an example on page 4.

Another highly instructive instrument of the geopolitician are charts which project the areas of the nations proportional to certain relevant factors. They give to the onlooker a visual impression of the relative importance of the different countries. Two examples of this technique show the areas of nations as proportional to their population (see page 7) and to their national income (See page 9). The same method can, of course be applied to any other factor, for example, natural resources, public expenditure, industrial potential, etc.

Looking back, Mackinder's work stands the test of critical examination; he had predicted the rise of Russia as the world's greatest landpower and foreseen the gigantic struggle now taking place on the plains of Europe and Russia: "He who dominates Eastern Europe dominates the World Island"; he had foretold the setback of seapower by landpower in combination with airpower; he had first proposed the exchange of populations as a means of settling border questions when he suggested the displacement of Germans from Eastern Prussia to Polish Posen and vice versa, thus granting Poland an access to the Baltic Sea without cutting a corridor through the territory of the Reich.

Besides, Mackinder's writings are remarkable for the absence of that boundless exaltation of power which makes Nazi geopolitics such indigestible reading. His book, *Democratic Ideals and Realities*, contains chapters on "The Freedom of Nations" and "The Freedom of Men"; dealing with the balance of power, it puts man and space, man with his ideals and space with its dynamics of power, into the right balance also.

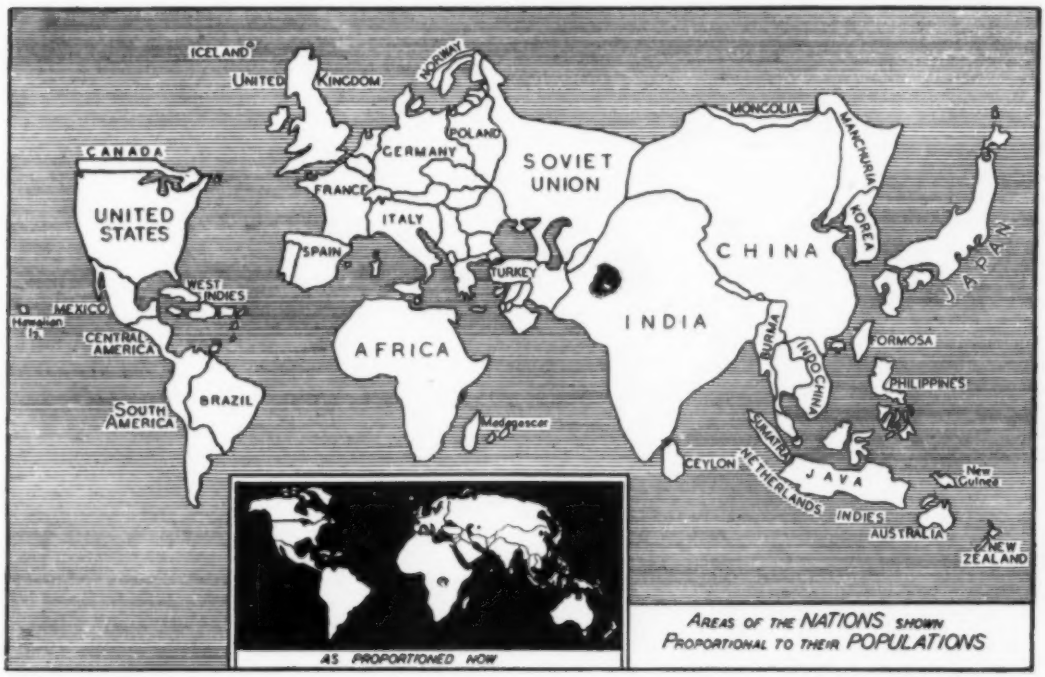
What distinguishes geopolitics from simple geography? General world geography describes the globe as a place, more or less suitable for human settlement because of differences in climate, altitudes and distribution of natural resources. Geopolitics is concerned with the factor of security, pertinent to human settlement; it examines the economic resources of countries under their aspect of "war-potential" the ideal case being "autarky", that is a degree of self-sufficiency which makes a nation independent of the natural resources of other countries; the geopolitician weighs the strength of nations and possible opposing coalitions in the "balance of power", analyses the changing significance of natural frontiers and man-made fortifications, and discusses the efficiency of political and strategic methods of warfare under given conditions.

Whereas the foundations of a geopolitical system were laid by the British school, Haushofer and his legion of collaborators at the "Institute of Geopolitics" in Munich applied themselves to mould into it a thousand details. They call geopolitics a synthetic science, because its material is collected from many sides; this the Germans did with that thoroughness which borders on the ridiculous. Dozens of sciences were adorned with the prefix "geo": geo-medicine, geo-psychology and geo-meteorology, are, for example, concerned with the right conditions for forced exchanges of populations, or with the ideal kind of equipment for soldiers fighting under foreign environment!

Dynamism is the catchword of the geopolitician: "All is flux". A new technical invention revolutionizes power relations in the world. The production of synthetic oil or rubber, for instance, increases the power of the country whose industrial organization allows its production on a mass scale, while it deprives of strategic importance the territories where these raw materials were processed so far. The same holds good for new weapons: the aeroplane, for instance, undermines the position of states whose might was built on the domination of sea communications.

The Nazis, of course, have assimilated this dynamism with that philosophy of moral nihilism of their own, which must not by necessity be associated with geopolitics. In their system, man has no place. The state itself is a living being which needs space and power for its growth. History has but one meaning: the struggle for space and always more space. No frontier is definite, no status quo durable and justified, and no treaty more than a sheet of paper.

We are witnessing in our time stupendous changes in the established power relations on our globe. The first Allied statesman to talk openly about them was Field Marshal Smuts in his remarkable address before the Empire Parliamentary Association. He bluntly contended that we need above all a new stabilization of the power factors in the world: "We cannot get away from the problem of power . . . Peace not backed by power remains a dream." The irrevocable decline of three first-rate states, France, Germany and Italy, is leaving a vacuum of power in Europe. This unique development is paralleled "by Russia's inexplicable rise, which we can only call one of the great phenomena of history, and which places her in a position which no country has ever occupied in the history of Europe".



Courtesy of *The Economist*

This chart impresses the fact that almost half the population of the world is living in India and China.

A "trinity of power" formed by Great Britain, the United States and Soviet Russia must become the new stabilizing factor in international relations. At the same time, Field Marshal Smuts is concerned that Great Britain, which has become "materially a poor country" will be an "unequal partner" in that combination. A reasonable balance of power calls for an extension of the "next world-wide British system" to the nations of Western Europe. Thus he pleads with the nations of Western Europe to choose "that grand company" for their future in this dangerous world and "to help themselves by helping to create *a great European state* which will be an equal partner with the other colossi in the leadership of nations".

General Smuts' "explosive" address had a truly tremendous repercussion. The European exile-governments in London, for obvious reasons, are in too precarious a position to feel entitled to definitely commit the future of their countries. There are many indications, however, that they are studying most seriously the implications of Smuts' proposal. A Belgian Minister has come forth with a statement to the effect that Belgium might be willing to become a member of the British Commonwealth. Dutch and Norwegian spokesmen, somewhat more reserved, wanted an assurance that such a constellation would enjoy the permanent support of the United States. On March 17th, General de Gaulle in his address to the National Committee of Liberation also pleaded for a federation among the Western European nations, which would form "a main centre in the world organization of production, currencies and security".

General Smuts undoubtedly has raised one of the most far-reaching issues of our time. Europe, exhausted by two suicidal wars, will need some time before she can stand on her own feet again. In the meantime, history is challenging Great Britain and the Anglo-Saxon world to frame a political and economic system in which the European peoples can live in security and welfare, while maintaining the traditions which, for 2,000 years, have made the greatness of the old continent.

Whereas General Smuts had singled out the future relationship between Great Britain and Western Europe, other British and Commonwealth statesmen broached the problem of strengthening the British position on the international scene through

a closer unity of purpose and action among the member-nations of the Commonwealth. The motif is again, as Lord Halifax claimed in Toronto, that "the British Commonwealth and Empire must be the fourth power in that group upon which, under Providence, the peace of the world will henceforth depend". Whereas public opinion in the Commonwealth nations of Africa and Asia on the whole expressed approval, Prime Minister Mackenzie King evidently felt it his duty to show the peculiar geopolitical position of Canada: "Behind the conception expressed by Lord Halifax and Field Marshal Smuts, there lurks the idea of inevitable rivalry between the great powers. Could Canada, situated as she is geographically between the United States and the Soviet Union, and at the same time a member of the British Commonwealth, for one moment give support to such an idea?" . . . "Our commitments on these great issues must be part of a general scheme, whether they be on a world basis or regional in nature." In fact, Canada is vulnerable in every conceivable future conflict between the great powers. Her position resembles somewhat that which, in the past century, Belgium has occupied between France and Germany. As the most important among the smaller United Nations, Canada intends to follow a line of her own, bent more towards a system of general collective security than toward any particular power-block.

The discussion of the British position in a world-wide balance of power system was provoked by the emergence of new power concepts in other parts of the world scene. Soviet Russia in her dealings with Poland has politely but firmly refused the good offices of her major Allies as an interference with what she considers her sphere of influence. The recent epochal changes in the Soviet constitution hold out tremendous potentialities which the U.S.S.R. may or may not use, depending on what circumstances—and especially the climate of her relations with the Western Allies—may be like. By granting to every one of the 16 republics in the Soviet Commonwealth a status of autonomy extending even to sovereign foreign representation, Russia is setting a framework which might attract Eastern and Southern European as well as Middle Eastern countries like Iran, to end their worries about security in a dangerous world of power politics by an apparently small sacrifice of national sovereignty. It is almost beyond our imagination to assess the implications of a Russian system extending to the Adriatic and Mediterranean Seas and the Persian Gulf.

While Russia in the Polish question is acting on the assumption that Poland, owing to its geographic position, pertains to a zone in which she will not tolerate but friendly regimes, the older structure of the Pan-American system has also been put to the test by recent events. The pressure brought to bear upon Argentina to break with the Axis and the non-recognition of the Bolivian Government reveals a trend, according to which the United States will not accept governments and regimes in South America inimical to her interests in the western hemisphere. Again a successful integration of the American continent would be of incalculable consequences on the rest of the world.

The technological and economic developments of our century unquestionably tend toward the integration of ever greater economic and administrative units. In all parts of the world scene — "German-Europe" and "Japan's Greater Co-Prosperity Sphere" constitute, of course, the most ruthless extreme examples—we are witnessing the emergence of new power centres in the sense that the predominant nation within a regional system is striving to mould a whole continent or at least vast territories into some economic and administrative unity.

Are we heading into a new era of power politics, with conflicts looming on a continental scale compared with which the yet short-lived, national conflicts of previous epochs would fade into insignificance? Or are we about to devise a new international structure in which the great world powers will take on the responsibility for the maintenance of order and peace over wide spheres, without infringing on the basic rights of the smaller nations, or provoking the opposition of other lions on the path? Have Moscow, Cairo and Teheran laid the foundation of a permanent co-operation of the four leading powers which will last beyond the defeat of their common enemies? Is it altogether

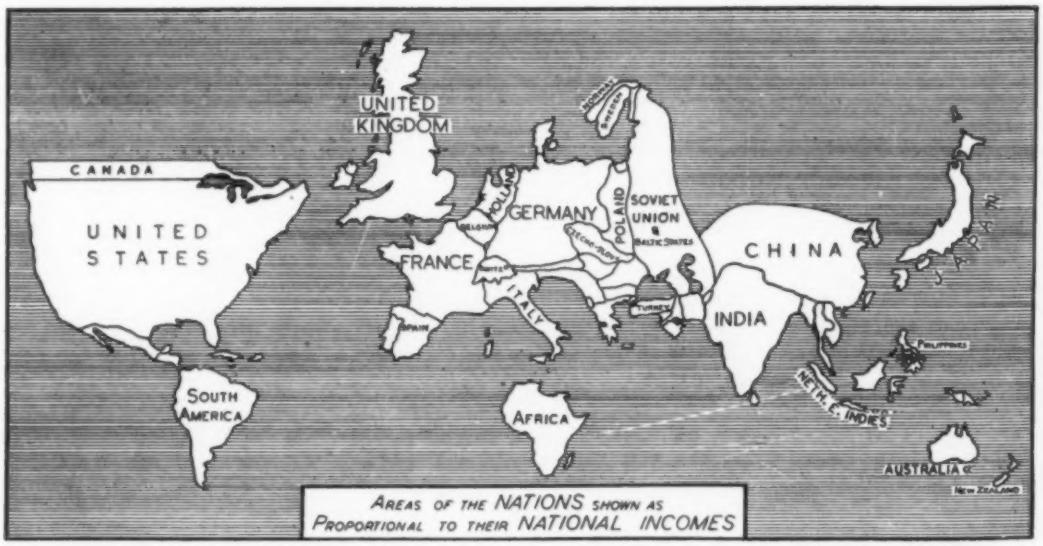
a realistic proposition that three or four powers could divide the world without the danger arising of new powerful counter-blocks being formed? Will Europe, shaken to-day in its deepest foundations, but up to this war the centre of gravity of world politics, permanently resign herself to be sliced into two spheres of influence, or will this menace perhaps awaken new revolutionary forces of unification? Is France ready to resign herself to a secondary role in Europe of which she was the master during the period between the two wars? What about Germany which, though defeated and completely disarmed, lying in the heart of that continent, may still weigh heavily in any future balance of power?

These are some questions with which the geopolitician is confronting the common man of the twentieth century. They are deeply discomforting to citizens who were looking forward to seeing—almost automatically—emerge a new and better League of Nations after the defeat of the aggressor nations, an international organization in which all the nations, large and small, should live together in freedom and welfare, under a system of collectively guaranteed security.

The mere discussion of geopolitics is deeply unpopular with the peace-loving peoples of the democracies, as, for example, the genuine criticism of Professor Spykman's book revealed. From time immemorial, however, international affairs have been ruled by stratagems of power. And our age may become the "century of the common man" only to the extent to which the common man will be able to grasp the real (and the faked) issues of power politics, may be willing to carry a share of the responsibilities which, so far, have been the professional privilege of the diplomats. The demons of power will not be exorcised by those trying to ignore them, but by the men who dare to look straight into their face.

Only one really effective answer can be given to them, the one which the Moscow agreements hold out by promising "the establishing at the earliest possible date of a general international organization, based on the principle of the sovereign equality of all peace-loving states and open to membership by all such states, large and small." It must be a tribunal to which every nation can submit its grievances and with the decisions of which even the greatest world powers will comply. However far distant the goal may appear, upon this task all our political education must be centred.

This chart emphasizes especially the importance of Europe, which, though it covers only four per cent of the world's surface, on this map overshadows by far Africa and South America.



Courtesy of *The Economist*

"Stripped for a fight, like"

BURNHAM BEECHES AND STOKE POGES*

by J. D. U. WARD

"THAT'S what I always think about trees in the winter. They're stripped for a fight, like." This reported remark of an enthusiastic Londoner was inspired by the trees near Burnham Beeches, which have themselves been described as the "finest remnant of ancient forest that can be seen in all England".

The beech tree of Europe, *Fagus sylvaticus*, is not normally long-lived. Two to three centuries is its normal span. But the process of pollarding, followed at intervals by repeated cuttings of the new growth, greatly prolongs the life of the trees, and some of the veterans at Burnham are thought to be 1,000 years old. Most of the more ancient trees are mere hollow shells, and it seems wonderful that such skeletons should support the lusty 200-year-old "limbs" that spring from some crowns.

The origin of the pollarding has been variously explained: there are fantastic stories that Cromwell cut off the upper parts of the trees and painted the boles that they might seem to be soldiers; that the Duchess of Monmouth caused them to be cut when her husband was beheaded; that the beechwood was required for gun and musket stocks. The true explanation is probably that the wood was taken for fuel, and that lopping ceased when coal became plentiful and cheap — about 200 years ago.

Though there survive in England many trees famous for their great age, very few if any stretches of forest consisting chiefly of ancient trees remain (demands for timber have been too urgent at different times), and so Burnham Beeches, with its veteran trees whose timber was not in great request for the shipyards, may well be ranked not only among the finest but also among the most ancient remnants of living forest in Britain.

It is interesting that Burnham Beeches should have found an articulate admirer to record their charms so long ago as 1737. In that year, the poet Gray, staying at his uncle's house in the locality, wrote to Walpole.

> "I have at a distance of half a mile, through a green lane, a forest (the vulgar call it a common) all my own: at least as good as so, for I spy no human thing in it but myself. It is a little chaos of mountains and precipices, mountains it is true that do not ascend above the clouds, nor are the declivities quite so amazing as Dover Cliffs; but just such hills as people who love their necks as well as I do may venture to climb, and crags which give the eye as much pleasure as if they were dangerous. Both vale and hill are covered with most venerable beeches and other very reverend vegetables, that like most other ancient people are always dreaming out their old stories to the wind:
>
> And as they bow their hoary tops, relate
> In murmuring sounds the dark decrees of fate,
> While visions, as poetic eyes avow,
> Cling to each leaf and swarm on every bough.

Gray began the composition of his famous *Elegy Written in a Country Churchyard* in the year 1742, when staying at Stoke Poges, near Burnham Beeches, but

*Photos by author

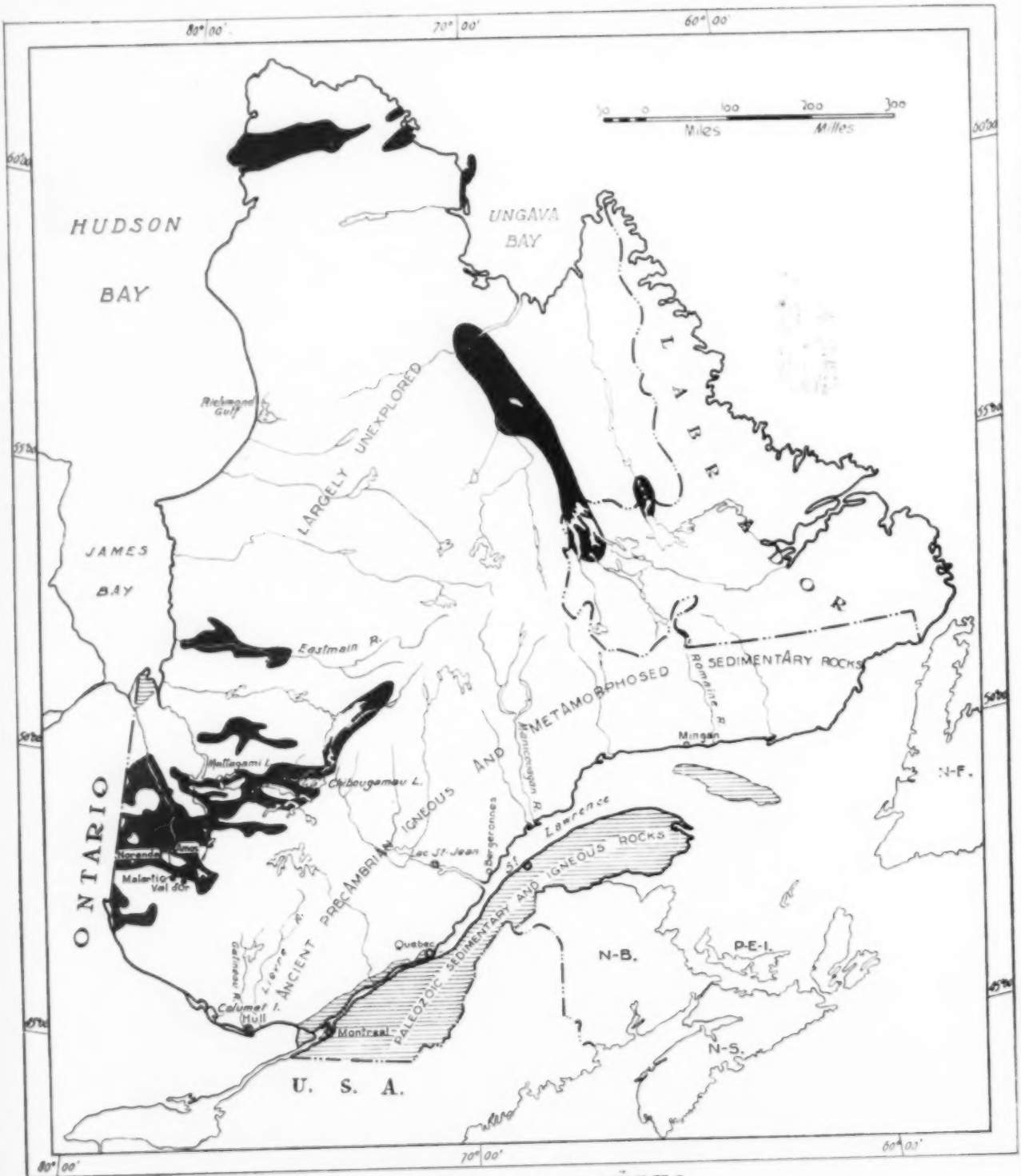
this, one of the most famous of all English poems, was not finished until 1750. In 1757 the author was offered the position of poet laureate but he refused it; in 1758 he closed the farmhouse at Stoke Poges and went to live in London. The next year, 1759, dates Wolfe's famous remark; while being rowed along the St. Lawrence to Quebec he recited the *Elegy* and then declared, "I would prefer being the author of that poem to the glory of beating the French to-morrow".

Stoke Poges church and churchyard are nearly always presumed to have provided the local inspiration for the *Elegy*. Founded in 1107, the church was rebuilt in 1330. The tower is no longer "ivy-mantled", but here are still "those rugged elms, that yew-tree's shade", and, here "heaves the turf in many a mould-ring heap". Within the church is the pew of the Penn family, whence came the founder of Pennsylvania; and their mansion, Stoke Park, is situated just on the far side of certain memorial gardens which adjoin the most-visited churchyard in England.

Back at Burnham, two or three different trees have been claimed as "yonder nodding beech that wreathes its old fantastic roots so high", but there is no certainty in the matter, and Gray's "fav'rite tree" may have been one that exists no more.

"Mere hollow shells"

"That yew-tree's shade".
Porch of Stoke Poges church



PROVINCE OF QUÉBEC

PRECAMBRIAN SEDIMENTARY AND VOLCANIC BELTS

QUEBEC, A MINERAL STORE*

by A. O. DUFRESNE

OF all the Canadian provinces—we are told by geologists—Quebec possesses by far the greatest area of Precambrian rocks . . . Precambrian! . . . The layman is struck with wonder by this magic expression used so profusely in the mining literature: always it refers to a store of precious metals and other useful minerals.

These rocks represent the oldest of those numerous series which have been formed through the long eras of geological history. In Northern Canada, through constant uplift and complete erosion of more recent beds which might have covered them, these older crystalline rocks are now so widely exposed as to form the rock surface of half the country.

In existence for upwards of a billion years, they have been many times subjected to violent upheaving, folding and large-scale fracturing. Many zones of this great Precambrian or Canadian shield, as it is often called, have been injected by hot fluids rising from deep down in the earth and, at different times and in convenient places, depositing their metal contents to form the orebodies which are to-day the object of the persistent efforts of our prospectors.

On the map, the Province of Quebec delineates roughly a triangle of an area equal to almost 600,000 square miles. Of this, the southern fringe only is composed of the younger sedimentary and metamorphic rocks of Palaeozoic age. The balance, or 95 per cent, is made up of the Precambrian hard crystalline plutonic rocks, containing in their folds and depressions remnants of old volcanic and sedimentary formations now usually distributed in elongated fashion to form what geological literature refers to as the 'sedimentary and greenstone belts'. These are punctured by numerous knobs of granitic intrusions, and it is often in their vicinity that the rocks have become the hosts of our valuable, now much searched-for, metal deposits. The very excellent geological map of southern Quebec, recently issued by the Dominion Geological Survey and to which the Quebec Department of Mines is proud to have contributed, shows a number of these interesting belts; they invite the prospectors, and in the post-war period they will be the scene of great activities.

The Quebec section of the Canadian Precambrian shield has already yielded such metals as gold, silver, copper, zinc, lead, iron, molybdenum, selenium, tellurium, tungsten and titanium, as well as several commercially interesting industrial minerals such as apatite, asbestos, feldspar, fluorspar, garnet, graphite, kaolin, magnesite, mica and pyrite.

Whether south, west, east or north, every part holds in store deposits typical of the region; it might be lead and zinc as on Calumet Island; or amber mica as in the Gatineau or the Bergeronnes areas;

*Where not otherwise credited, Province of Quebec Government photos

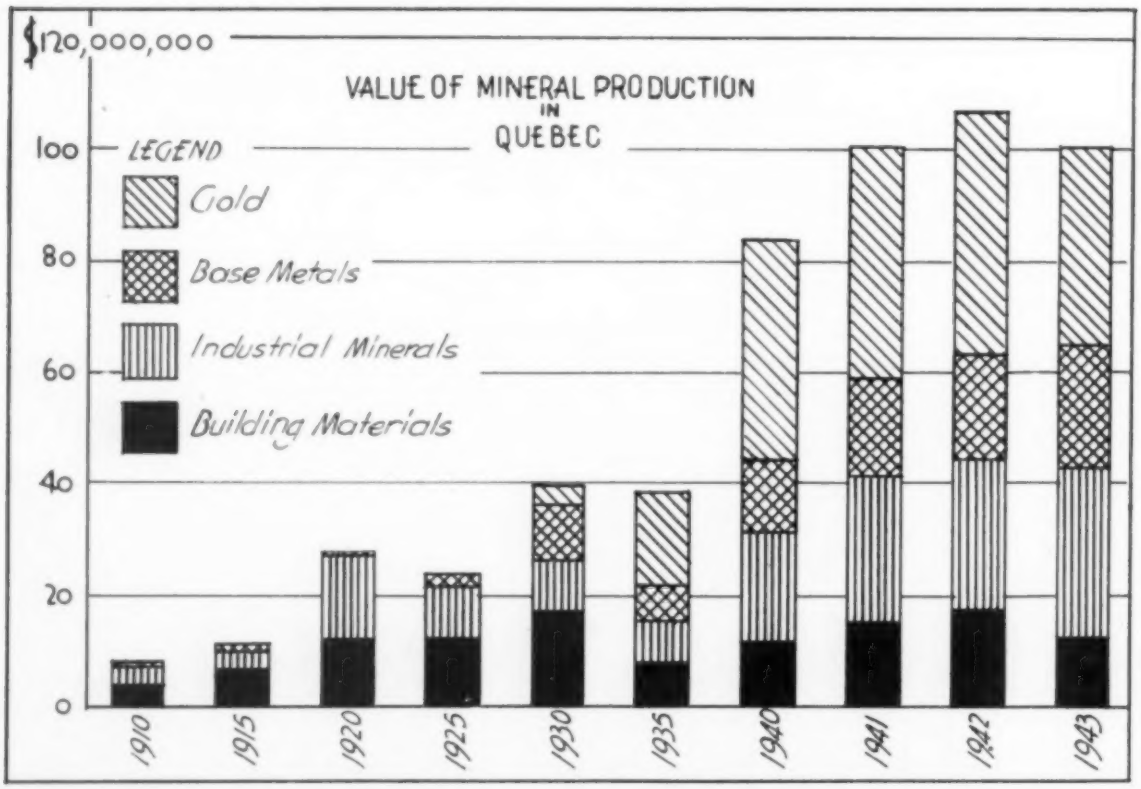
Iron mine, St. Urbain. Furnaces now dismantled

apatite as in the Lievre River basin; titaniferous iron ore as found in large bodies along the north shore of the St. Lawrence River; rich iron ore beds as in the central Ungava territory; copper ores as now mined in the Rouyn district; or gold ores as produced along the one-hundred-mile belt of the Beauchastel-Rouyn - Bousquet - Cadillac - Malartic - Dubuisson-Louvicourt section of western Quebec.

What sort of a country is this Precambrian area which has become such an economic asset to the Dominion of Canada, and the astonishing possibilities of which in Quebec are just being realized? To the traveller descending the lower Ottawa and the St. Lawrence, from Ottawa to the Straits of Belle Isle, the imposing wall of bold hills—cut here and there by deep, steepsided, valleys—may present an uninviting front, unless his thoughts were to wander to the pleasures of careening down its vertiginous slopes in the pursuit of winter sport or to the thrill of casting a line into the quiet pools that dot the streams in their last few miles of rapid descent to near sea-level. Once this southern rampart has been scaled, however, and the adjoining fringe of mountainous territory has been penetrated, the traveller would agree with the many explorers who are unanimous in describing the uniformity of the physical features of the vast interior. G. A. Young (1) has aptly described the general character of the Canadian shield when he states that the country "is one of low relief composed of gently sloping regions broken by the valleys of larger rivers and lakes or by occasional hills that rise a few hundred feet above the general level of the country".

The Quebec portion of the shield is for the most part just as described by Dr. Young: it consists generally of areas of low relief separated by somewhat level plains formed of clay and sand deposits which, in many cases, were laid down in ancient lakes of the Glacial Period. Within the irregularities of its surface is a maze of lakes, large and small, linked by watercourses converging to form the many large rivers, broken only here and there by rapids and falls, and offering a convenient mode of penetration by water travel far into the interior of the country. Some sections are more hilly, and they are generally much more rocky; others, like the vast section between the upper Ottawa River and James Bay, are very flat, with

(1) *Geology and Economic Minerals of Canada*, Geol. Surv. Can., Econ. Geol. Series No. 1, 1926, p. 5



Granite ridges west of Little Saguenay

very few hills standing as markers a few hundred feet above the generally level lake —and swamp-covered clay country. Elsewhere, as in the headwater country of those large rivers flowing into Lake St. John, a deep covering of sand and boulders is spread over and hides the rock surface.

Especially in the southern half of the shield, a dense forest everywhere masks the subsurface and adds to the difficulty of prospecting. But, on the other hand, it is a most valuable asset which is being well exploited either for pulpwood manufacture or for building timber used in mining camps and for other purposes. This forest also protects the many varieties of fur-bearing animals and plays an important part in preserving other assets of the country.

The larger rivers drain wide watersheds and carry great volumes of water. In places, especially in the southern part of the shield where they descend from the general plateau-level toward the sea, they have been harnessed, and hydro-power plants send their electricity to mine, metallurgical, pulpwood or other industrial centres. The low cost of their development has made possible the development at Arvida, in the Lake St. John district, of one of the largest aluminium producing plants in the world.

A notable feature of this vast Quebec Precambrian country is its division into three large sections by imperceptible ridges delineating the watersheds between the drainage basins of the St. Lawrence River, Hudson Bay and Ungava Bay. A fourth section, representing the north-eastern watershed, forms Newfoundland's Labrador.

Which of these sections is of greater value economically is a question that cannot be answered now. Too little or even relatively nothing is known yet of this truly immense territory. Except for a small part of the southern section, topographically and geologically the country is insufficiently mapped for any sort of even preliminary inventory of its natural resources. Few are the explorers who have entered it and then only on more or less hasty trips to obtain cross sections, or a sort of bird's-eye view, of the northern interior. Of these explorers, the most outstanding is A. P. Low who, between the years 1885 and 1900, made several explorations of long stretches of the Ungava and Saguenay territories. The very readable original accounts of his travels appear in various volumes of the Dominion Geological Survey. Some of these, unfortunately, are out of print, but extensive extracts from them are available in a publication of the Quebec Department of Mines (2).

Except for a small portion of the southern section of the Precambrian area, mainly comprising that part controlled by

(2) *Extracts from Reports on the District of Ungava or New Quebec*, 3rd edition, 1929, Department of Mines, Quebec

General view of Rouyn and Noranda C.P.A.L. photo

the Ottawa River watershed, the inland country, until recently, and to a great extent as yet, has been populated only by a few isolated groups of Indians. Nevertheless, at all the strategic points along the sea shore and sometimes on the large inland lakes, Hudson's Bay Company trading posts are to be found. Until to-day, fur trapping has been the only occupation of these inhabitants. In the St. Lawrence River basin, in the midst of an agricultural development, an industrial invasion, which began some fifty years ago, has been obtaining wealth from its forests, its water powers and its mines. To-day settlements are to be found as far north as the forty-ninth parallel, either in the Lake St. John district or, in the west, near the Quebec-Ontario boundary line.

In less than thirty years a new agricultural country, of some 20,000 square miles in area, has been opened in that section of the shield lying in the southern part of the James Bay watershed. To-day there lives here, full of hope in the success of its enterprises, a population of 120,000 inhabitants. This healthy growth is in the midst of our new mining camps; oddly enough, here, farms and mines, born together, are almost superimposed. Co-operation between the two is a valuable asset to the general development of the country: the settlers supply farm produce, wood and labour, while the producing mines and the prospects offer a market and much needed jobs. The many colonist roads make easier the prospecting of favourable townships.

Section of Val d'Or
Val d'Or Studio photo

Siscoe Gold Mine R.C.A.F. photo

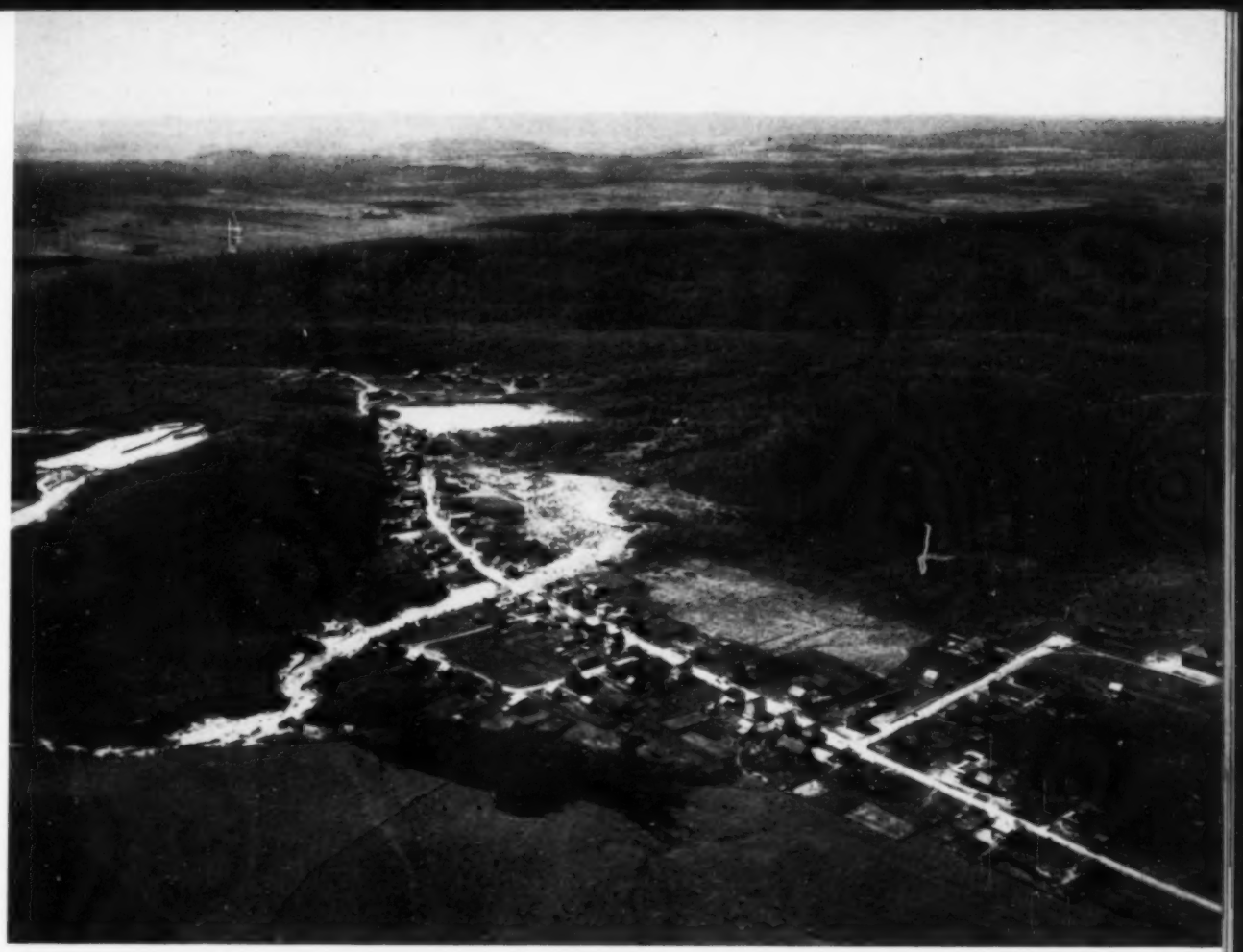
Until recently, access to the vast, only partially explored Quebec north land was by ships plying the rough seas of the Gulf of St. Lawrence, Hudson Strait or Hudson and James Bays, to reach some trading posts, and thence by canoe up the large rivers, just as was done from the remote villages and depots of the southern avenues of penetration. But, from now on, aviation alone will supply means of travel into the distant and otherwise almost inaccessible country.

New facilities in aeroplane transportation, especially since this war, have changed our ideas of travelling into the interior of this little known country. The lack of accurate maps has been and still is a great deterrent to exploration. The necessities of war, however, have hastened the mapping by aerial photographs, and it is believed that, immediately after the cessation of hostilities, our Governments will be able to make available to our explorers, prospectors and geologists very good, accurate and complete maps of all sections of at least the southern half, but still a big part, of Quebec.

It is of more than passing interest to note here that the impulse aviation received during the First World War had a marked influence on the development of the mines of western Quebec. It is not generally known that the first commercial attempt in Canada to establish flying service was made by the Laurentide Air Service Limited in 1924, when this organization maintained a line between Haileybury, on Lake Temiscamingue, and Rouyn on Osisko Lake (3). To-day Rouyn in Temiscamingue, Amos, Senneterre and Oskelaneo in Abitibi, St. Felicien in the Lake St. John area, and Seven Islands in Saguenay County, are the better known airports from which prospectors and mining engineers have flown to northern places in quest of mineral discoveries.

As a mineral host, the Precambrian rocks have attracted attention from the early colonization days of the French regime. Back in 1667 the great intendant

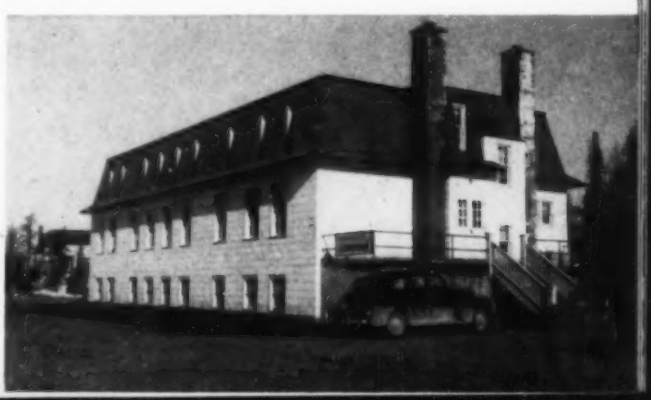
(3) Quebec Bureau of Mines, *Report on Mining Operations*, 1924, pp. 45-47



Tetrault Mines, Montauban C.P.A.L. photo

Colbert sent the Sieur de la Potardiere to study the possibilities of the iron ore of Baie St. Paul, 60 miles below Quebec. A few years later, in 1686, Sieur de Tonty was sent to investigate the report of the existence of a lead discovery on Lake Temiscamingue. We know nothing of any mineral exploration in the Precambrian wilderness of Quebec for the next one hundred and fifty years. In 1829, however, phosphate bearing deposits were discovered in the vicinity of Gatineau and Lievre Rivers, but they lay dormant until 1875. Following the first exploitation of these deposits, phosphate mining in the province was an active industry. Graphite was later mined in the same region. To-day the lower or southern part of the shield is famed for the quality of its amber mica; it is also producing feldspar, kaolin, molybdenite, zinc and lead ores, and a magnesitic rock which has given rise to an important refractory goods industry.

What is now designated as western Quebec, a wide section traversed by the National Transcontinental branch of the Canadian National Railways, came into the limelight as a mineral province only after the building of that branch in the wilderness between Cochrane in Ontario and Quebec City on the St. Lawrence. No one realized then that the flat, swamp-like country immediately east of the Quebec-



Top left:—Lamaque and Val d'Or Mines
R.C.A.F. photo

Bottom left:—Sullivan Gold Mines, Sullivan
C.P.A.L. photo

Right:—The new Lamaque Hospital at Bourlamaque

Ontario provincial boundary would, a few years after the war of 1914-18, become the centre of the greatest prospecting boom of our time. To Edmund Horne, a lone prospector, we owe the discovery of the mine which, now owned by Noranda Mines, Limited, came into production in 1927, and which attracted thousands of people to this attractive long stretch of mineral lands. Further prospecting has shown the existence of at least three other parallel belts which have widened the north and south extent of this mining field. So much has this region developed that to-day it gives work to 10,000 miners, and supports a mining population of 40,000 living in such model towns as Belleterre, Arntfield, Rouyn, Noranda, Duparquet, Normetal, Bousquet, Cadillac, Malartic, Val d'Or, Sullivan and Pascalis.

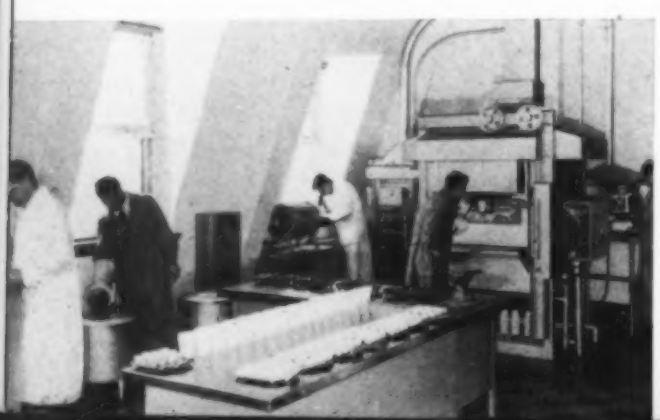
Since the first copper shipment in 1927, from the Noranda smelter, to the end of 1942, this western section of the province has produced $446,923,278 worth of copper, zinc, gold, silver, selenium, tellurium, tungsten, molybdenum, pyrite and arsenic.

In that period, copper ore has been shipped from six different mines; zinc from four, molybdenite from two, and gold from twenty-seven straight precious metal mines. Such results obtained in only two decades of prospecting and developing is a most remarkable achievement which will go down in the annals of the mining world.

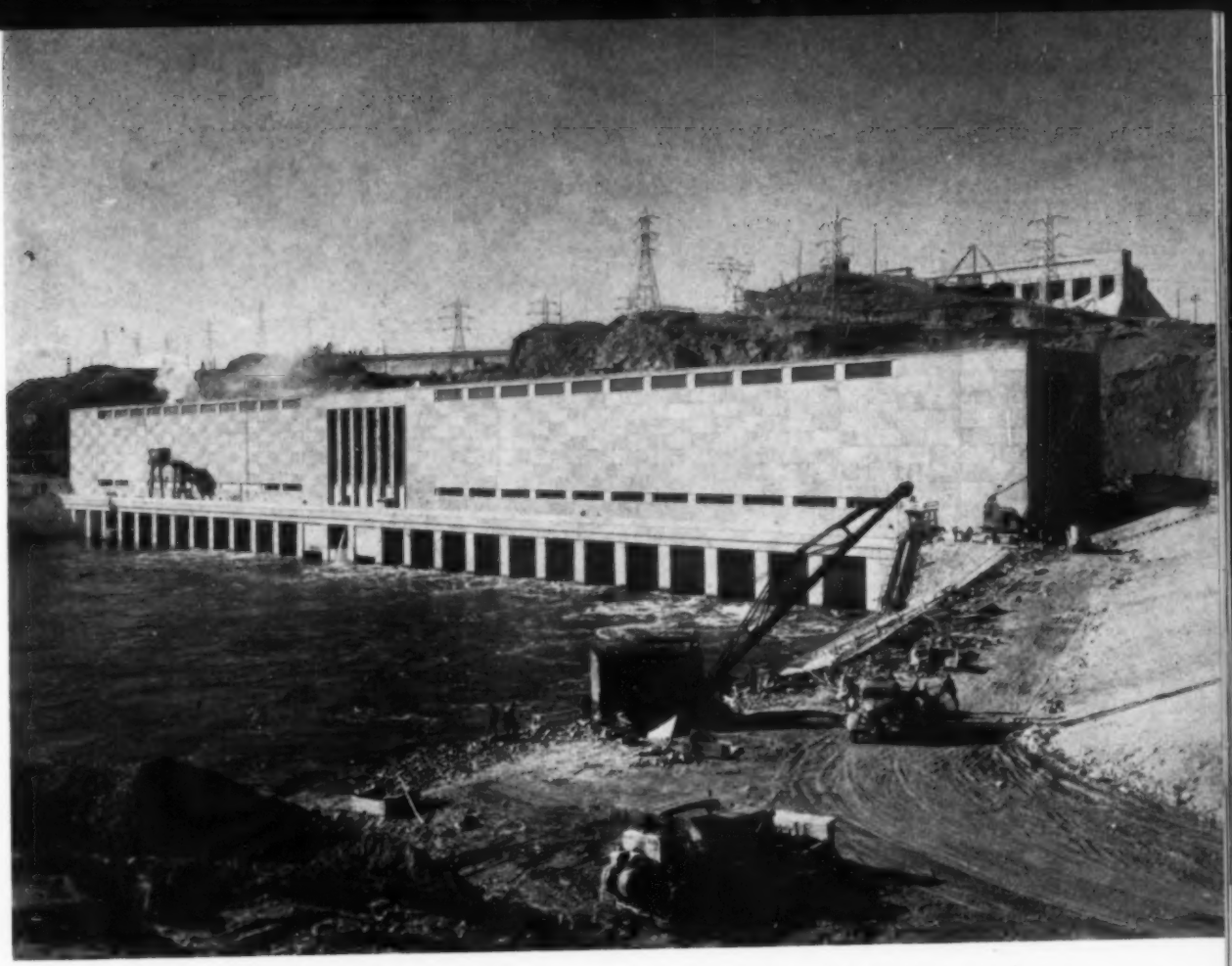
The war has greatly influenced the mining development in western Quebec camps. In the early days of the conflict, the necessity of gold as a medium of settling the purchases of Canada in foreign lands gave a considerable impulse to gold mining. Eventually, however, priorities for men and material placed this activity into an inferior position; new mines could not be brought into production and older ones had to reduce development work and even tonnage output with the result that 1943 showed a substantial decrease in gold shipments. On the other hand, base metals were in greater demand. Notwithstanding a price ceiling, copper mining has been increased to such a point that one-third of the ore treated at the Noranda smelter represented custom ore, that is, ore coming from other than Noranda's mine. The Abitibi district developed two molybdenite mines treating together a daily average of seven hundred tons of ore. Risks and scarcity of shipments have created a market for arsenic oxide, a subsidiary product of two of our gold mines, and also for pyrite, a subsidiary product of our copper mines. But, the greatest progress has undoubtedly been made in zinc metal shipments which, in 1943, amounted to 116,382,081 pounds, from five producers, as compared to 28,758,759 pounds in 1939, mostly from two producers. This section of the province stands, at this moment, with five producing properties which did not exist before the war.

The Province of Quebec has, south of the St. Lawrence, another mineral region, from which pyritic copper ore has been mined, in the Sherbrooke area, almost continually since 1865; asbestos, from the serpentine rocks of the Danville-Thetford-Broughton sections, since 1878; steatite (soapstone) in Bolton and Leeds; chrome iron ore near Richmond and Coleraine. Notwithstanding the attraction of these mineral belts, which have their extension northeastward as far as the end of Gaspe Peninsula, and notwithstanding the long established mining industry which is one of the great assets of these Eastern Townships, little prospecting is being carried on in this belt of Palaeozoic (post Precambrian) rocks, though it has its rewards as is shown by the discovery in 1943 of the important copper-lead-zinc deposits of Moulton Hill.

Prospectors and mining men are lured by the Precambrian; their eyes are set on the North. Mattagami, Opemiska, Chib-



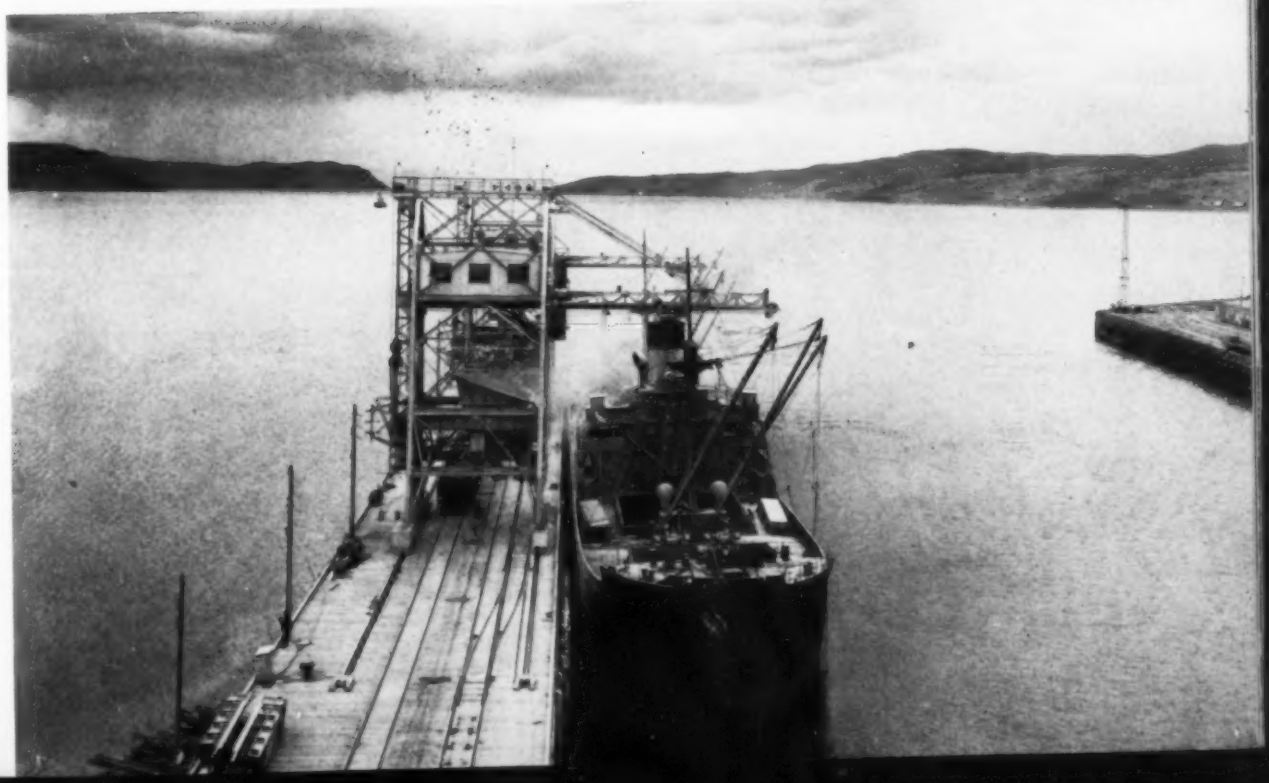
Fire assay laboratory of the Department of Mines, Quebec City



Shipshaw Powerhouse under construction. Dam No. 4 and headblock in background

S.S. *Corabella* at Port Alfred

Aluminum Company of Canada photos



GLIMPSES OF MINING OPERATIONS

Photographic Arts photos

Above:—Man-way between lower levels

At top:—Drilling.

Above:—Pouring slag into smelter.

At top:—Lowering timber to new shaft from sub-level.

ougamau, Manicouagan, Ungava, Romaine are names passed on from one prospector to another, and spoken of in mine offices and geological bureaux. Already to there trek men looking for adventure, and to there goes, in the hope of rich reward, speculation money of the public. The untrodden, unexplored, unprospected, undeveloped vastness of our province offers unsuspected mining opportunities to those who have the health and energy to undertake the hard battle which is that of the North.

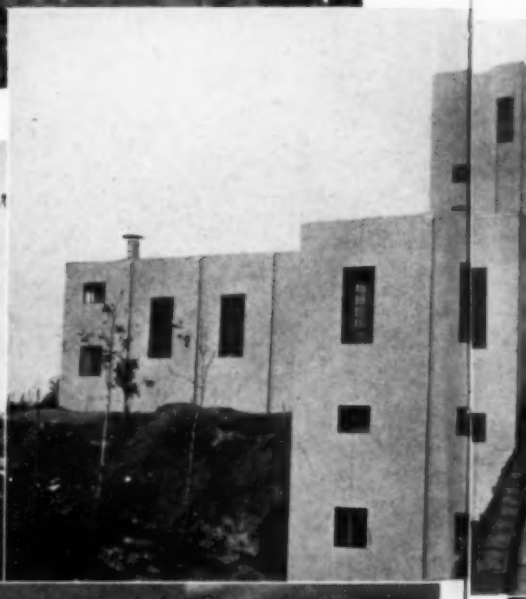
Great belts of copper—and gold-bearing rocks have been located, and discoveries have been recorded at Opemiska and Chibougamau, whilst less known areas spread from Richmond Gulf to the heights-of-land in central Ungava. Strewn with lakes which offer facilities for the aeroplane, this country can now be considered easy of access. What the outboard motor did to prospecting after the 'twenties in sections closer to the jumping-off places on our railways, aviation is expected to do in the coming post-war period.

Selecting the gold-bearing ore and discarding waste down the rock shutes. They also crack the rock into smaller pieces for faster milling.

Photographic Arts photo

Below:—Kiamika, Labelle County. A snug village on a flat surrounded by hills of Precambrian rocks.

Above:—Boulet settlement, house and buildings at St. Mathieu d'Harricana



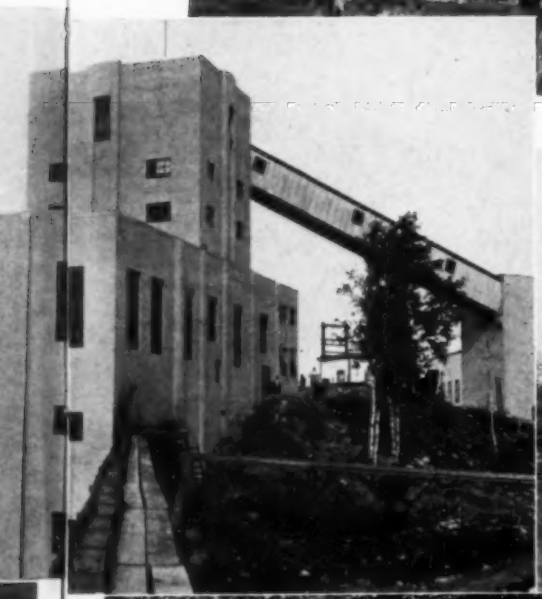
Above:—O'Brien Gold Mine, Cadillac township, Abitibi County

At top : — Belleterre Mine, shaft No. 2 and plant

Centre:—A modern ore treating plant at the Mic-Mac Mine

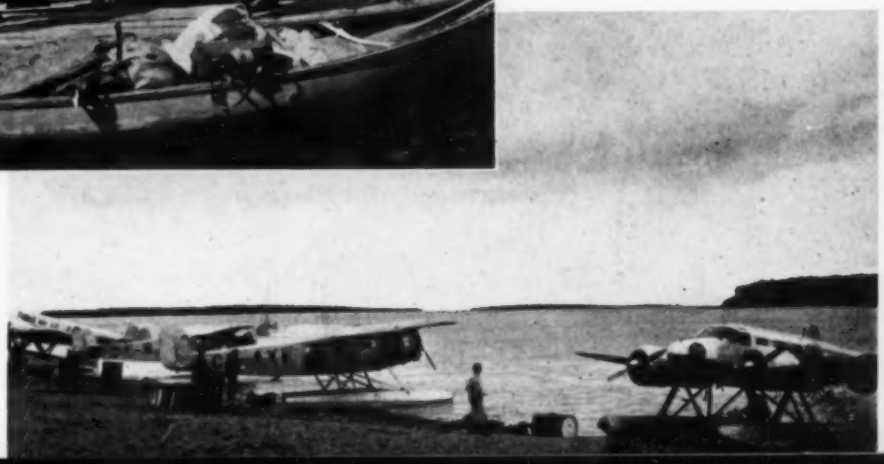
Above: — Miners' homes — outside Noranda
Photographic Arts photo

Left:—Kelly Mine, G.P. No. 1 — looking north, Callieres township



Above:—Quebec Government ore treating plant at Val d'Or.
Val d'Or Studio photo

At top :—Normetal copper-zinc mine



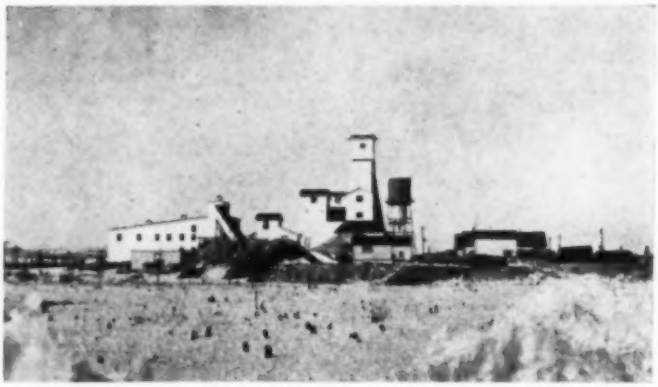
Above: — For centuries the canoe has taken the *coureurs des bois* to the most inland places of the province.

Right: — Quebec Airways planes on beach at Havre, St. Pierre

A molybdenite roasting plant at Quyon

Blackburn Mica Mine, Cantley, Papineau County

Canadian Carborundum Company, Two Mountains' Mill



Surface plant, Senator Rouyn Mines Limited

Surface plant, Stadacona Rouyn Mine

Wartime Metals Corporation, La Corne Molybdenum Project. General view of headframe and mill

Surface plant, Amulet section, Waite Amulet Mines Limited

Indian Molybdenum Mine, Preissac township, Abitibi County

DIAMONDS FOR VICTORY

by **E. R. YARHAM**

WE all know that old saying—diamond cut diamond, and it is as true as ever it was, for diamond is the hardest substance known to science (only tantalum or an alloy of tantalum rivalling it). No invention of man has yet equalled it, and only diamond can sheer its way through diamond.

But to-day there is a grimmer motto among the men whose inherited craft it is to cut diamonds, men whose ancestors mastered its secrets centuries ago, those experts who escaped by devious ways from the great diamond-cutting cities of Amsterdam and Antwerp with tens of thousands of pounds' worth of stones stuck in their pockets wrapped in bits of old newspapers, or stuffed in the linings of their suits, or maybe carried in tattered old attaché cases.

They got away in destroyers, in fishing smacks, in battered rusty tramps, or in ancient crates of planes that rocked crazily as they took off just as the Nazi panzers drove coastwards and the Luftwaffe flattened Rotterdam with hell dropped from the skies. They have not forgotten, and they declare diamonds are cutting Hitler's throat. What is more they are working in London, Birmingham, New York, Toronto, and Montreal, among other cities, tooth and nail to get that job done at the earliest possible moment.

Now the British Government is controlling diamonds. Strange things to "control"—jewels. Yet laconic announcements from Whitehall stated that Sir Cecil Rodwell had been appointed controller of industrial diamonds, and Mr. F. A. Mathias of gem diamonds. War always results in an enhanced demand for precious stones. During the World War they largely ousted gold as a symbol of wealth. People bought them up because they were regarded as the best protection against the perils of currency inflation.

Of the two kinds, strange though it may sound, the former are far more important in war-time, though far different from dazzling jewels of fashion. These diamonds, says the Ministry of Supply, are "rough" ones—yet they are literally "Diamonds for Victory". Cutting tools working to an accuracy of an infinitesimal part of an inch, are diamond-tipped, and these are the "weapons" which our precision engineers handle when turning out the flood of machines destined to swamp the vaunted mechanized forces of the Axis. Among the first things Russia asked for was diamonds, for the tank, the plane, the big gun, the battleship and the corvette all owe much to the "rough" diamond of industry.

Yet though only rough—most of them lustreless, flawed and discoloured, sickly and outcast as jewels of adornment, they are just as adamantine in their hardness as diamonds whose names are household words, the Cullinan, the Koh-i-Noor, the Vargas, the Jonkers, Excelsior, and a dozen others. And upon these rejects the war production industries of the United Nations is absolutely dependent. It is part of our blockade policy to deprive the Nazis of the chance of getting them, and, during the last war, Germany was so desperately short of diamonds that the women were compelled to give up even their finest stones in rings and other jewellery. Something of the same kind may happen again, for the Allied blockade against diamonds has been extremely effective, and it is believed the enemy has not been able to smuggle so many stones through as between 1914 and 1918. When war began in 1939 Nazi agents in the Low Countries were feverishly offering four times the standard market value for stones, but, unluckily for them, they were nearly all held by the trustworthy agents of the British Diamond Corporation. When the panzers did burst through, to their chagrin the invaders found at least £1,000,000 worth of diamonds had vanished, and all the diamond-cutting machinery smashed irretrievably. To-day the United Nations control practically 100 per cent of the world's diamond output.

The uses to which diamonds are put in peace and war are legion. In fact we come across some every day, although very often we do not realize it. The finest dental instruments for cutting and filling make use of diamonds. Fountain pens, which are so smooth in places, and in others beautifully ribbed with fine lines, owe this to the diamond, which is also used for polishing the stems of pipes. Cutters can be impregnated with the powder of small diamonds so that the hardness is such that no known surface can resist it. Diamonds are used in

the making of spectacles for drilling holes in the lenses, and in the engines of cars. They are employed for the machining of big-end bearings and aluminium alloy pistons. Likewise the aluminium pistons in our tanks are ground with diamond-pointed tools.

Good watches are set with diamonds, and every chronometer on board the ships of the Royal Navy and the Merchant Navy is diamond-trued. They are employed too, in the bearings of electric meters, for fine boring and in the turning of electric-light carbons. Indeed, the brilliance of electric globes is entirely due to the diamond, because the filament wires are drawn through tiny plates set with the smallest diamonds imaginable; they are, as a matter of fact, diamond dust. Wire-drawing is one of the most marvellous applications of the diamond. In the engines and fuselage of a fighter plane there may be no less than 200,000 yards—say just on a dozen miles—of fine copper wire. Every inch of it has been produced from molten copper drawn through a diamond die.

The stream of bullets that a fighter's guns pumps out at hundreds a minute also owes something to the diamond industry; so, too, do the mighty 16-inch naval guns, which hurl a shell weighing a ton over a score of miles with ease. Huge rollers flatten out the metal of the giant barrels, and they themselves were ground into shape by a wheel trued by a diamond. The most powerful dreadnoughts afloat owe their being to diamonds no bigger than a pea, for they alone are able to cut and drill the pattern of the steel plating. Again, the steel helmet worn by sailor and soldier alike these days, is stamped by a heavy press shaped by diamond-ground carborundum. Steel circular saws, with diamonds embedded in their edges (a big one will have up to a thousand) shear through the hardest rocks under the sun. Some of these saws have a life of 2,500 sawing hours before they need resetting. The latest cutters, whirring round at 4,000 revolutions a minute, go through quartz as if it were cheese. Wafers of porcelain, "pencils" of plate-glass, Scottish and Cornish granite, can be sliced with the ease of a bacon-cutting machine. We could hammer and cut at them for hour after hour without making any impression, but the diamonds go through them with cuts clean and straight as if resistance is no more than that of a lump of butter.

Nothing can stand against them. Tungstone carbide is harder than any steel, but it can be sliced through in a few seconds, leaving a fine mirror-like surface. Not so long back the diamond world was alarmed when industry had placed at its disposal certain enormously tough alloys which could be turned to the precision cutting of machinery and get results at a much lower cost. The question at once presented itself: would diamonds be abandoned? The Rand and the Congo need not have been alarmed, for when metallurgists sought for a substance hard enough to cut out tools in the new alloys and give them a keen edge, they had to turn to diamonds again.

There is, indeed, hardly a branch of twentieth century war industry which can do without the diamond. The tiniest bolt, the biggest fly-wheel—these and all the tools and products in between are ground into shape by hard carborundum wheels, and only diamonds can cut and true up these. And as for the diamonds themselves, it still holds good that only diamond can cut diamond. The glorious scintillating stones of lovely jewellery have been cut and polished by their ugly sisters, the Cinderellas of the diamond world. The diamonds which adorn rings, bracelets, necklaces, and the rest, were themselves to begin with, dull, grubby-looking stones, resembling nothing more attractive than bits of frosted glass, pink, yellow, amber, blue. It is the cutting and polishing which makes them beautiful.

The secrets of the craft have been jealously preserved by craftsmen for centuries. They are handed down from father to son, and as proving the continuity of the industry one cutter is using to-day a balance for weighing the stones which has been in his family for 300 years. But as the result of the establishment of the industry outside the Continent some of the more technical aspects of it have been revealed.

Occasionally a magnificent stone is discovered which has been polished by Nature herself. This polishing was brought about by the scouring of diamond-bearing rocks during the Ice Age, the constant rubbing with ice and rock polishing the surface and revealing the lovely crystalline structure of the stone. It is the lapidary's task to imitate this natural process, converting a dull, lustreless stone into a glittering jewel. As soon as the diamonds arrive at the factory they are graded for size,

colour and quality. There are four main processes, cleaving, sawing, cutting, and polishing.

Of the two methods of cutting diamonds, cleaving and sawing, the latter is the more modern, and, whereas Amsterdam specialized in cleaving, Antwerp did most of its work by sawing. The cleaver's task is to remove the non-crystallized coating from the diamonds, and upon him depends in great measure the ultimate value and beauty of the stones. The cutter who cleaves examines the stone and picks out the cleavage planes, which would be invisible to ordinary observers. He cuts a narrow notch at the point selected with the aid of another diamond. A rather dull or steel edged instrument, really a diamond-tipped chisel, is laid on the spot and a sharp blow is given with a mallet. The diamond immediately divides in the desired direction.

For sawing, special instruments, extremely thin, made of phosphor-bronze, are employed. An outsize one had to be made for the Jonkers diamond as none of those in existence was big enough. The discs are only 1-200 of an inch thick, and they rotate at 4,000 revolutions per minute. In practice it is not the disc which cuts, but it serves as a vehicle to carry the cutting or abrasive compound consisting, as before, of olive oil and crushed diamond powder. The task of cutting a big gem is a very long one, for it takes about a month to saw through a 50-carat diamond.

After the diamond is divided it is made fairly symmetrical by smoothing away irregularities, the process being known as brutage. The old hand method consisted of fixing two diamonds in cement at the end of a handle, and then rubbing against each other until the surfaces were smooth. This is a tedious job, but it survives, although machinery has been introduced, greatly speeding up the work.

At one time the cutting was done entirely by hand. First of all the diamond was "fixed" by embedding it in a fusible alloy in a little copper cup called a dop. The alloy melted at about 440 degrees Fahrenheit, and the stone was stuck into the apex of the soft, hot cone at the angle decided upon by the cutter. The solder was then cooled in water to give a firm setting. The portion to be ground off was left exposed, and then the diamond was rubbed against another diamond similarly set, until the face was produced. The work was slow and laborious, and called for great care and skill. When this face was done the alloy was softened by heating, and the diamond reset to produce another face. So the work went on until the stone was finished, and the powder was always saved for polishing.

In recent years mechanical methods have been introduced. The cutter cements the stone into a copper cone or dop, as before, and attaches it to the head of a small lathe revolving at 600 revolutions a minute, and with the aid of another diamond cemented to a tool similar to that used by the cleaver, the revolving diamond is worked until it acquires the shape of a cone.

Now comes the polishing, again a case of diamond cut diamond. Diamond powder, saved from former operations and crushed inferior diamonds, mixed with olive oil, is the compound employed. The stones are polished on horizontal discs called skaifs or schjiven, the exact composition of their alloy being something of a trade secret. They are operated by electricity and revolve up to 2,500 revolutions a minute. In the olden days horses were used to turn them, and some cutters even used their wives! The stones are fixed in dops, and are placed to rest on the disc just like a needle rests on a gramophone record. Adjustable ones have been introduced to save the tediousness of re-fixing in the alloy for dozens of faces. Lead weights are used to vary the pressure against the cutting disc. The skaifs are porous, and they are treated with carborundum, an abrasive of great cutting power, and then with the diamond powder compound.

Although such mechanical aids are now used and have greatly influenced the art, these alone would be useless. Fundamentally, it is still the marvellously accurate eye of the cutter which decides the final beauty of the gem. The utmost care and watchfulness are indispensable in order to bring out the beauty and light to the best advantage. The angle at which the stone is cut is all-important, and no machinery can decide this. There may be forty, fifty, or more facets—the two chief forms being the brilliant cut, 58 facets, 33 on top and 25 beneath, and the rose used for stones not thick enough to cut as brilliants, there being up to 32 facets in three rows. All must be cut mathematically exact to

yield the best results by refraction and reflection, and each gathers the light round about into the centre of the stone, from which it is thrown back in rainbow hues of flashing fire.

No less than 60 per cent of all the diamonds mined are used for industry. A big motor firm will use a thousand a year even in peace-time, and working under war-time pressure it wants more. In the usual way between one-quarter and one-third of the industrial diamonds in use are worn up after a year; these days the proportion has risen to about one-half. Obviously this raises an urgent problem of replacement, and, as well, with the swiftly expanding war industries of the United States, and the growing number of uses for them, the quantity of industrial diamonds called for is ceaselessly rising. As suggested earlier, practically all of the world's resources are available to the United Nations, and output has gone up tremendously. The last boom year for diamonds in pre-war days was 1937, yet world output now exceeds that year's output by 50 per cent.

Perhaps even more important is the fact that the most skilful of present-day cutters are working for the Allies too. Before the war Antwerp and Amsterdam were the world centres of diamond cutting; they sold over £10,000,000 worth of stones a year. The Nazi invasion smashed their industry, but led to it being set up in Britain and Canada. Quite apart from industrial diamonds, the United States is anxious to buy £6,000,000 worth of gem stones every year. A year ago Britain could only supply half a million worth, but output has been steadily rising. These figures prove that. Two years back, after the Nazis overran the Low Countries, some diamond cutters and polishers, just a handful, reorganized a small factory in the south of England. There were only four benches. Now this factory consists of 84 polishing benches, 69 sawing heads and eight cutting machines, working full time. About three-quarters of the output goes to America, the rest consists of diamonds for the war industries. One Birmingham merchant was lucky enough to get away with a considerable quantity of machinery. Scientists came to his aid there, Birmingham University analysing the material of the skaif he had obtained in Belgium, so that more could be made, and this has been of much assistance in establishing the industry.

Diamond cutting and polishing is not an occupation that can be learnt in the proverbial five minutes. As a craft it is more like an English lawn, which takes three hundred years to come to perfection. One cutter talking about his job said: "How did I start? I started at nine years old watching my father who had watched his father, who had watched his. Then I cut apples by the hour to learn the correct angles of the facets. Then I sat for a year just watching my father cut. Then I was allowed to do the simplest operations and, after five years, to cut the top face with my father, this time, watching me. And so on. It has been in the family for three hundred years. It's in our blood."

Taste as regards diamonds is completely different in East and West. In the East the custom is to polish the rough stone without cutting it. This is why some of the largest single stones are found among the treasure hoards of Indian princes. The Nizam of Hyderabad (this dynasty is the richest family in the world, reckoning their wealth in scores of millions) paid two million dollars for the Victoria, a 180-carat stone. The craft of the lapidary has been known for thousands of years, but it was not until 1475 that the art of cutting the hardest gems was invented by Louis de Berquem in Amsterdam and Antwerp. After that, in the West, the cutter utilized his skill to reveal the flawless beauty of the stone. That is why half a dozen smaller stones cut from one big one may each be more valuable than the original in its uncut condition. During the cutting and polishing more than half the rough stone may be lost. The legendary Koh-i-Noor, centuries old, weighed 900 carats originally, but it was very badly cut to begin with, and, when finally perfected by Amsterdam workmen in London, in order to restore its loveliness, it was reduced to only 106 carats. The Victoria, mentioned above, was cut from a mass weighing 457 carats, and in the case of the celebrated Jonker stone 300 carats of the original 726 were reduced to dust during the various operations. As may be imagined, only the leading men in the industry are trusted with the handling of outstanding stones. In peace-time half a dozen earned princely incomes.

Stories of how the world's most famous

diamonds were cut and polished are classics in the history of gem cutting. Until 1905 the largest known diamond was the Excelsior found twelve years before at Jagersfontein by a native while loading a truck. It weighed 969½ carats and was cut into ten stones weighing from 68 to 13 carats. This beautiful diamond was cut in 1904, and the most elaborate study extending over two months was given to the work beforehand. The Excelsior was of very irregular shape and numerous models were made of it to determine the most advantageous way of cutting it. The stones which resulted were all splendid jewels.

The Jonkers diamond, found eight years ago, is pure white and flawless, and like most other of the world's renowned jewels, was revealed in the most accidental way. A poor digger named Jonker had been working for 18 years, hardly able to keep his head above water, and he had almost given up hopes of having any luck. His son was directing a native at the claim, and the black was washing the bucket gravel when he stopped suddenly, went to the cleaning camp and scrubbed the stone. Throwing his hat into the air he shouted, "God, baas, I've found it." The son raced off to the father, who went down on his knees and thanked God, "I was down on my luck", he said. The stone was about the size of a hen's egg and weighed 726 carats.

The Jonkers was delivered by ordinary postman in London and was sold for £70,000. It found its way to New York, and the owner could not find anybody to insure the cutting as the risk of damage was too great. When it was cut he was too agitated to dare watch it. The stone was entrusted to an expert named Lazare Kaplan, a Belgian, who was helped by his son. For some days before the actual sawing he went into the country trout fishing to steady his nerves. "I felt the whole world was watching me", he stated. For months before the operation he studied the Jonkers under the microscope, and he triumphed. He succeeded in dividing it into a dozen perfect stones, with a total value of about £400,000.

The Cullinan is, in some ways, the most celebrated of all the world's great diamonds. This stone, three times bigger than any found before it, was discovered in the the newly-opened Premier mine in the Transvaal, 1905. It was bought by the Transvaal Government and presented to King Edward VII in commemoration of the granting of self-government. The diamond was of such gigantic size, equal to that of a cricket ball, that it was literally priceless. It weighed about one and a third pounds, and the largest stones cut from it weighed 516½ carats, 309 carats, 92 carats, and 62 carats respectively. The two largest were known, by wish of the King, as the Stars of Africa, and were allocated one to the royal sceptre and the other to the crown.

The late Sir Arthur Levy and his brother, Mr. Alexander Levy, notable experts on diamonds and other precious stones, advised the King as to the treatment of the jewel. It was decided to have it cut, and it was sent to Amsterdam for this purpose The delicate task was entrusted to the most eminent expert of the day, Joseph Asscher. Among lapidaries it is held that the work he did in cutting the Cullinan was outstanding and has never been surpassed. He gave the most concentrated attention to the magnificent stone, but he was so nervous that at the time he was actually cutting it he had a doctor in attendance, fearing if he made a mistake the shock would kill him. As it was the relief at finding the cutting successful was so overpowering he almost collapsed and did not recover for a long time. The Cullinan was divided into nine major stones, 56 brilliants, and a number of unpolished "ends". The work took nine months.

The Asschers of Amsterdam have been famous in the industry for a long period. It was reported some time back that Abraham Asscher, the head of the firm, and his two sons, had been executed for alleged anti-Nazi activity. The story has not been confirmed, but it is very possibly true, since this is the usual Nazi way of treating fine craftsmen.

Top left:—Fairford Mill

Top right:—Devon thatcher at work

Left:—"Granny", Bibury

Evening sun, Bibury

THROUGH OLD ENGLAND'S COUNTRYSIDE

by J. D. U. WARD

CANADIANS visiting England have usually concentrated upon cities and historic towns. London, Oxford, Cambridge, Canterbury, Winchester, Stratford-on-Avon — these are the chief centres of attraction, and the English countryside is merely something quaint and pretty through which one passes when travelling as swiftly as possible from one cathedral to another.

Now I should like to point out that rural England is a place where people live and work; that it has a history and survivals as interesting in their way as any poet's birthplace; and also that many Englishmen regard the country as the only true, worth-while England. For them the cities are deplorable excrescences built and inhabited by a lower race of people known as "townees".

A good hint of the serenity and calm of the old rural outlook may be observed in typical buildings. Consider Fairford Mill, or such cottages as those at Bibury. Surely they have an air of quiet self-sufficiency, which is yet innocent of smugness or self-satisfaction? Here are stone walls and stone-slatted roofs, in the

true Cotswold tradition. The words of an American poet and critic (Odell Shepard) may be aptly recalled:

> As I went down across the hills
> From Colne to Quenington
> I saw the roofs of Bibury
> Shining in the sun.
> I shall remember Bibury now
> Until my days are done.
>
> I shall remember cottages
> Carved out of silver and gold,
> And how the great beech-darkened hills
> Tenderly enfold
> That little human island
> Washed round by meadow and wold.

But the same gracious yet firm spirit may be found many counties away, where buildings have walls of cob (mud and straw mixed, with white or cream colour wash) and roofs of thatch. There is now little or no building with cob (partly because local authorities stipulate for damp courses), but in recent years thatched roofs have become more popular than ever before. Not only are old roofs re-thatched, but many builders of new houses demand the primitive covering. It is not only picturesque but also cool in summer and warm in winter. In other words, the thickness of a thatch roof makes it a good insulator of the climate. Thatch is of several kinds, varying according to locality. An inferior thatch of wheat-straw may last only ten years. A good thatch of wheat straw, if adequately protected against birds, will last over 20 years before it needs to be renewed. The best thatch of all, Norfolk reed, will last over 50 years.

Time was when nearly all Britain's buildings were thatched, but other more lasting materials have displaced straw and

Top:—Thatched church, Uggleshall, Suffolk

Centre:—Tithe barn, Great Coxwell, over 600 years old.

Bottom:—Tithe barn (often described as finest in England), Great Coxwell

reeds; now, a thatched church is almost a rarity outside Norfolk and Suffolk, and it is unusual to find very large buildings of any kind thatched. The vast tithe barn of Abbotsbury, however, provides an exception. Half this great building, in which the medieval monks used to store the tributes they levied on the agricultural community, is now in ruins, but the other half is still kept sound, dry and useful by its roof of thatch.

Tithe barns* are among the noblest of all buildings to be seen in England's countryside, and it is interesting to notice how church-like many of them are. The great porches, built high so that fully loaded waggons might be drawn in, are comparable with the transepts of an abbey.

Nearby, there often stands a dovecote, anywhere from 300 to 600 years old. Here lived and nested the semi-tame doves or pigeons which fed freely upon the unfortunate cultivators' crops. The privilege of owning a dovecote was, of course, restricted to certain classes; otherwise the heavy toll taken by the birds would have been intolerable to the farming community. It was for the table that the birds were kept.

A small thick-walled building seen near a tithe barn is not necessarily an ancient pigeon house. It may be a cage or lock-up. At one end of the ancient tithe barn at Lacock, for example, there is a square lock-up, where lesser malefactors would be imprisoned. In past centuries lock-ups were sometimes located on bridges over rivers. One typical example survives at Bradford-on-Avon. Above it is a weather-vane in the form of a fish, and Bradford's

*See "The Tithe Barns of England", p. 209, October, 1938. *Canadian Geographical Journal*

Top:—Kebles' Bridge, Eastbruch (Cotswolds). "Late" type of clapper bridge

Centre:—Patcham dovecote (perhaps fourteenth century)

Bottom:—Dog-wheel formerly worked by turnspit dog. At George Inn, Lacock, Wiltshire

Horningsham Chapel, the oldest non-conformist meeting house in England

lawbreakers were accordingly said to be lodged "under the fish and over the fish". Some of the ancient bridge lock-ups were originally chapels, in which travellers prayed for the soul of the bridge-builders. It may be recalled that the bridge lock-up at Bedford, where John Bunyan the author of *Pilgrim's Progress* was imprisoned, was originally a chapel. A bridge chapel (for a short time used as a lock-up) survives at St. Ives in Huntingdonshire.

Old methods of punishment have, of course, left many other traces. There are still stocks in many English villages. Stocks were contrivances (usually with a whipping-post at one end) in which a lawbreaker was held by the legs. There is a tale of an English chief justice who, when out with friends, thought he would like to see what it felt like to be in the stocks. So he put his legs through the holes and his friends turned the key — and went away. Presently there came a passer-by. "My good man," said the pompous and empurpled judge, "release me". "Nay, nay," was the answer, "You wouldn't have been put there without a good reason."

Ducking chairs, in which scolding women or other nuisances were ducked in river or horse-pond, survive in several country towns, and at the village of Fordwich (which is on the River Stour and was the ancient port for Canterbury) there still stands at the end of the courthouse the old jib by which the ducking chair was swung out and lowered into the water.

Of gibbets, only one now survives in England. Gibbets were used not merely for the execution of felons but also for the continued display of their corpses in irons — as a warning to other criminals. There are many records of townspeople complaining of the stink, when gibbets were situated too near to towns. Corpses were often left on gibbets until they rotted completely and became skeletons, in which small birds would nest. An entry in the diary of a seventeenth century explorer may be recalled. It ran:

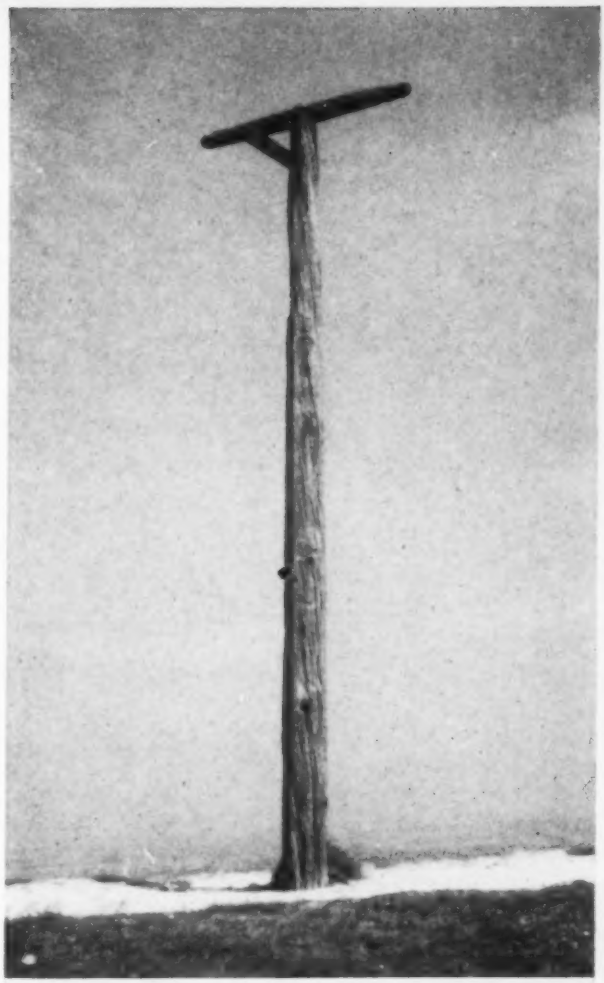
> "After having travelled many months through wild countries inhabited by savages, we came this day to a gibbet, by which we know that we have, through God's grace, been spared to return to a land of civilized people."

In the village of Lacock, whose tithe barn and lock-up have already been mentioned, there is a much rarer relic in the

form of a dog-wheel, let into the wall of the kitchen of an inn. This is one of the treadwheels in which unfortunate dogs had to work, so that — by means of a chain or belt — the spits on which meat was roasted before the open fire might be revolved. Whether similar turnspit dog-wheels existed in America I do not know, but they were common in Germany, and very many American farmers still living have used dog-power for the churning of butter. In the more remote parts of Wales, it may be added, dogs are to this day employed to work treadwheels attached to butterchurns, though the practice is illegal.

In parts of Wales the primitive small boats known as coracles are still used by professional salmon fishermen. These "cockleshells" are essentially the same as those made two thousand and more years ago, the only notable difference being that the "skin" (the old term is still used) laid over the woven framework of laths now consists of tarred canvas, whereas formerly the hides of cattle were used. Coracles are no longer used in Great Britain anywhere save on the rivers Teifi, Towi, Dee and Upper Severn. Special local survivals of this kind are, in the nature of things, unlikely to be seen by a chance traveller unless he is seeking for them, and knows where to look.

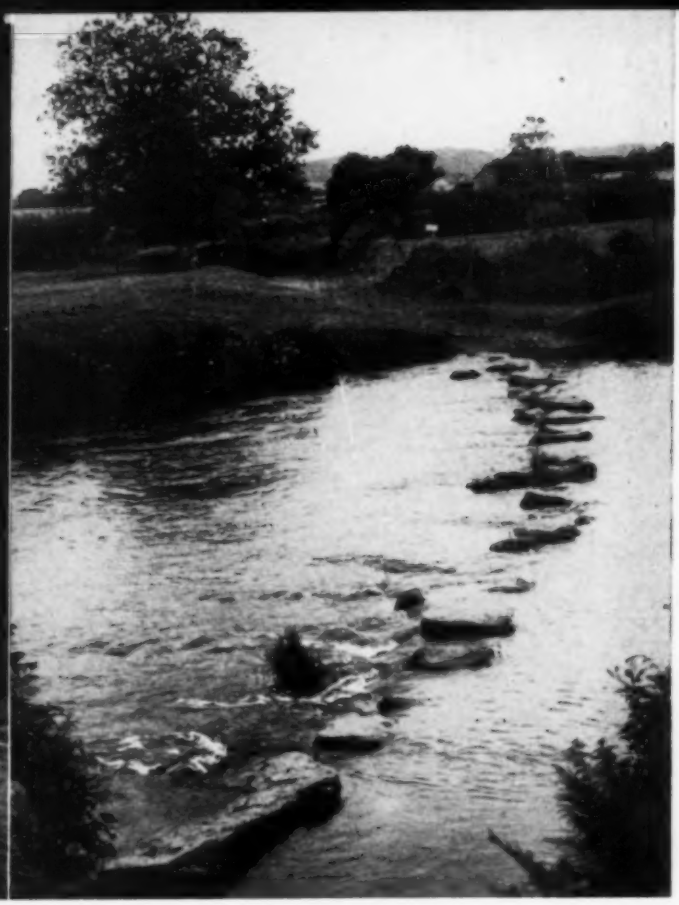
Again, odd occupations or livelihoods such as the collecting of sand-hoppers (for bait), or of grass-snakes and adders (for the London Zoo), or of snails (for consumption by tobacco-workers in the city of Bristol) are too rare and specialized to come to the notice of the chance traveller. Yet these and comparable curiosities are part of the very fabric of English rural life.



At top:—Gibbet on the summit of Inkpen Beacon, Berkshire

Right:—The lock-up on the bridge, Bradford-on-Avon

Tarr Steps



Early clapper bridge, Chagford, Devonshire, probably over 2,000 years old.

The shallow and swift-running streams of England and Wales are remarkable not only for their salmon and trout (the fishing is usually strictly preserved and private) but also for their beauty and the beauty of their bridges. In some places stepping stones still survive. This simplest method of making a dry-foot crossing at a ford is worthy of note because stepping stones are in a sense the "fathers" (that is, they are the extreme prototypes) of all stone and concrete bridges. Then there are also clapper bridges, made of great stones laid and balanced together without mortar or cement: these represent the next stage of development. Some are probably over 2,000 years old, but others, which are less crude and show a closer relationship to modern bridges than to stepping stones, are scarcely 200 years old.

The common use of pack horses and pack donkeys survives in the wilder parts of the United States, long after it has disappeared from almost the whole of Great Britain. But there is one place in England, on the coast of Devon, where donkeys are still employed to pack seaweed up the cliffs. The paths leading to certain ledges, where early potatoes are grown, are so steep, narrow and tortuous that no vehicle can come to them, so pack donkeys are used both to carry up the seaweed (which is used as fertilizer) from the rocks below and also to take the potatoes to the top of the cliff.

Coracle on the water

Carrying seaweed on Devon Coast

The ducking chair jib, Fordwich

Even scarcer and fewer than pack donkeys in England are draught oxen. So far as is known, there are only five draught oxen still working in the whole country. The distinction of retaining the use of oxen for some of his farm work belongs to the Earl Bathurst, and it is pleasant to know that, if the war permits, more are to be trained for work on his estate, Cirencester Park. For many centuries all or nearly all the ploughing in Britain was done by oxen.

Finally, a word of warning. Because curious survivals or historic rural relics have been the subject of this causerie, it should not be imagined that the English countryside is dead or at least moribund. Side by side with evidence of past life, and, even more obvious, is evidence of present life: for example, though many conservative traditionalists deplore the fact, it is nevertheless true that tractors and not horses (much less oxen!) have done most of the work on the land newly-broken under the "Plough for Victory" campaign. Again, in recent years there have been big developments in the making of silage, the artificial or mechanical drying of grass, and in the use of combination harvester-threshers in wheat and oat fields. Thus, the farmers and other countrymen of Old England, though conscious of the past and doubtless overmuch biassed toward the methods of their fathers and grandfathers, do make some progress.

Two of Lord Bathurst's oxen

AGRICULTURAL LANDS IN THE CANADIAN NORTHWEST

By E. S. ARCHIBALD

THE needs of national defence during the past few years have greatly increased the public interest in the greatest of our last frontiers, the Canadian Northwest. This interest is reflected in the demand for information regarding the natural resources and the possibilities of developing them. Important natural resources have already been developed in parts of our Northwest, but, considering its size, we are perhaps safe in assuming that its potential wealth has so far only been scratched. Reliable information concerning the natural resources of that great part of Canada is only available for comparatively small parts of the region. The events of the past two years, however, have stimulated exploration, and, if this can be maintained, it ought to be possible, within a few years, to draw a fairly accurate picture of the possibilities of the Northwest.

For this purpose the Governments of Canada and the United States joined forces in forming two separate but interlocking committees designated the North Pacific Planning Project. The ultimate object of this project, after defence measures are satisfied, is to explore and develop all potential resources to the mutual advantage of these two countries.

The Canadian section of this project is under the able chairmanship of Dr. Charles Camsell, Deputy Minister of the Department of Mines and Resources, than who no one is more thoroughly conversant with this country. Anticipating that agricultural problems must be given more serious consideration than has been the case in the past, a joint committee has been set up in Canada to deal with this problem and explore all available data. This committee consists of representatives of the Dominion Department of Agriculture and the Department of Mines and Resources. The work of this committee includes a thorough review of any soil surveys and topographical surveys which have been made and the results of agricultural experiments which have been conducted on Dominion Experimental Stations and Sub-stations in northern British Columbia, northern Alberta, the Northwest Territories and the Yukon. In addition, all available records from the various sources as to successes in gardening, the growing of field crops or livestock production have been thoroughly reviewed. The sources of information have been as far-reaching as possible, and in this the Provincial Governments, the Hudson's Bay Company and the Department of Mines and Resources have contributed much valuable information.

Upon the recommendation of this committee, an agricultural exploratory survey was made in conjunction with similar surveys by representatives of the Department of Mines and Resources, including foresters, mineralogists, representatives of the National Parks Branch and others. This exploratory survey in one summer necessarily had to be confined largely to the new area opened up and immediately adjacent to the Alaska Highway from Dawson's Creek to the Alaska boundary and various sections in the northern Yukon. Dr. A. Leahey, with the assistance of Dr. V. C. Brink, formed the agricultural survey party. It is to them that the writer is indebted for the material contained in this brief review. Dr. Leahey was particularly fitted for this work since, while still engaged on Province of Alberta soil-survey investigations, he carried out a number of surveys in northern Alberta.

Since the Canadian Northwest has no well defined physical boundaries, there can be differences of opinion regarding its extent. For the present purpose the Canadian Northwest is taken as that area which comes within the scope of the North Pacific Planning Project. Roughly this area includes all that part of Canada lying north and west of the 53° north latitude in British Columbia, the Athabaska River in Alberta, and the western limits of the Precambrian shield in the Northwest Territories. The greatest north-

Left, top to bottom: — View of Dominion Experimental Sub-station at Smithers, British Columbia. Field of Victory oats in foreground yielded 111 bushels per acre.

Field of wheat at Beaverlodge, Alberta, which yielded about 48 bushels per acre.

Photo by W. D. Albright

Threshing grain from Experimental plots at Experimental Station, Beaverlodge, Alberta. More reliable information on crops and cropping practices in our Northwest is necessary to its wise development.

Photo by W. D. Albright

south length of this area is about 1,100 miles and the maximum width, near the 60° north latitude, is about 900 miles. It is estimated that this vast area covers about 800,000 square miles, or approximately 22 per cent of the total area of Canada.

Agriculture already occupies a position of considerable importance in the more southerly part of this vast area where railway facilities are available. The extensive settlements of the Upper Peace, where some 11,000 farmers are cultivating over a million acres of land, are producing large quantities of grain and cattle, while the settlements along the railway to Prince Rupert in central British Columbia are also making a contribution to our food stocks. The purpose of this article, however, is not to dwell on present accomplishments but to summarize the possibilities of future development of agriculture in so far as our rather limited knowledge will permit.

Agriculture is dependent on suitable climatic and soil conditions. Other factors will largely determine whether agriculture is desirable or not, but, without a climate that will permit the normal development of crops and without lands that have reasonably fertile soils, good topography and good drainage conditions, agriculture is physically impossible.

CLIMATE

Weather stations in the Northwest, while comparatively few, are sufficiently scattered to give us a fair picture of climatic conditions, especially along the rivers. The following table shows some information pertinent to agricultural possibilities.

Yearly and Summer Precipitation and Mean Temperatures and Frost-free Periods for Stations in Northwestern Canada*(1)

Location	Precipitation		Mean Temperature		Frost-Free Period (No. of days)
	Year	(May, June, July and August) Summer	Year	(May, June, July and August) Summer	
The Athabaska, Slave, and Mackenzie Rivers					
Fort McMurray, Alta.	17.7"	9.1"	29.9	55.9	66
Fort Chipewyan, Alta.	12.6"	6.0"	25.3	54.7	74
Fort Smith, N.W.T.	13.0"	6.7"	23.3	55.0	56
Fort Resolution, N.W.T.	11.9"	4.8"	23.2	52.0	93
Hay River, N.W.T.	11.8"	5.3"	23.7	51.5	87
Fort Simpson, N.W.T.	13.0"	6.3"	23.8	54.9	84
Fort Norman, N.W.T.	11.2"	6.5"	19.5	52.1	44
Fort Good Hope, N.W.T.	10.6"	4.9"	18.7	52.0	52
Aklavik, N.W.T.	10.3"	4.1"	15.3	46.2	65
The Alaska Highway and Yukon Territory					
Beaverlodge, Alta.	17.5"	7.7"	35.6	56.0	85
Fort St. John, B.C.	15.7"	8.4"	35.0	56.8	108
Fort Nelson, B.C.	13.9"	6.6"	30.2	57.4	103
*(2)Fort Vermilion, Alta.	11.7"	6.6"	27.0	55.2	87
Watson Lake, Y.T.	15.5"	6.6"	27.9	53.1	62
Carcross, Y.T.	9.0"	3.1"	29.2	49.9	43
Whitehorse, Y.T.	10.7"	4.1"	31.1	52.7	48
Carmacks, Y.T.	11.3"	5.1"	23.7	51.5	74
Dawson, Y.T.	12.6"	5.3"	22.8	54.3	79
Mayo, Y.T.	11.4"	5.6"	24.6	53.1	68
Central Interior of British Columbia					
Prince George, B.C.	20.9"	6.4"	39.0	56.0	65
Smithers, B.C.	15.3"	5.5"	38.0	53.0	38

*(1)Data compiled from information supplied by Meteorological Service of Canada

*(2)Fort Vermilion, while not on the highway, is included here for purpose of comparison with Fort Nelson.

Above:—A modern set of farm buildings in the Upper Peace River district

Photo by W. D. Albright

Top right:—Medium clearing in the Bulkley Valley, British Columbia

Right:—Good livestock is essential to success in most of our northern areas, Shorthorn head at Wembly, Alberta

Photo by W. D. Albright

Right:—A vegetable garden at Fort Vermilion, Alberta

Bottom right:—Fine crops of potatoes can be raised in the Northwest.

Below:—Field of alfalfa on Experimental Sub-station, Smithers, British Columbia

Swede turnips at Fort Smith, N. W. T., on June 8th

Wheat in test plots. Photo taken at Fort Vermilion, Alberta, on July 21, 1942.

Onions grown from seed at Experimental Substation, Fort Vermilion, Alberta. Barley test plots in background. Photo taken on July 21, 1942.

The table on climatic data shows that, except for the southernmost points, the Northwest is a region of low precipitation throughout the year. A sharp break in precipitation apparently occurs between Fort McMurray and Fort Chipewyan in eastern Alberta and Beaverlodge and Fort Vermilion in western Alberta or between Fort St. John and Fort Nelson in eastern British Columbia. This break in the plains region east of the Rockies apparently occurs between the 57° and the 58° north latitude, as Keg River post, located about 18 miles south of the 58° in the Fort Vermilion district, has a yearly precipitation of 16.3 inches.

Generally, the mean annual temperature decreases from south to north, but the mean summer temperature does not follow quite the same trend. The southern stations have the highest mean summer temperature, and the station farthest north, Aklavik, has the lowest mean summer temperature, but the intermediate stations do not show a gradually cooler climate toward the north in the summer months.

Too much weight should not be given to the frost-free period. True, it is very short at some points, but agriculture can be practised successfully at Smithers, British Columbia, which has the shortest frost-free period.

It is of interest to note that Fort Resolution and Hay River Post, located on the south shore of Slave Lake, have cooler and drier summers than points to the south and north. While the frost-free period is somewhat longer around this great lake than at Fort Smith or Fort Simpson, it is doubtful if this fact compensates entirely for the retarding effect of the cooler and drier summers on crop growth.

From the viewpoint of summer temperatures it would appear possible to mature crops, particularly early varieties, as far north as Fort Good Hope on the Mackenzie and Dawson on the Yukon. Aklavik, with a mean summer temperature of 46.2°, would appear to be in a doubtful class as far as many crops are concerned. The long hours of daylight appear to compensate to a considerable degree for the temperatures in summer, which are cooler than those experienced in more southern latitudes.

The best criterion of climate from the agricultural viewpoint is whether or not and what crops can be successfully grown. In this regard we have some useful information. The merits of the present established farming districts are well known. Not so well known is the fact that all the crops that have been grown successfully by the Dominion Experimental Station at Beaverlodge, Alberta, have been grown with equal success at the Dominion Experimental Sub-station at Fort Vermilion, which is located over 200 miles farther north. Despite the rather dry climate, as measured by inches of precipitation, in no season since the Station was established at Fort Vermilion in 1908 has there been a crop failure. Still farther north we have records of experience and experiments showing that certain field and garden crops have and are being raised as far north as Aklavik on the Mackenzie River and Dawson on the Yukon River. From present information it would appear that in these higher latitudes much greater success has been achieved with garden crops than with grain crops.

Unfortunately, there is practically no information on growing conditions back

Lush growth of wild parsnip (*Heracleum lanatum*) in the valley of the Liard

Soil profile showing the typical clay till of the Fort Nelson plain.

Soil profile developed on lacustrine clay in the Dezadeash Valley west of Whitehorse, Y. T.

Clay soil along the lower benches of the Dezadeash Valley west of Whitehorse, Y. T.

from the rivers or lakes north of the 59° north latitude. Present and past gardening or farming activities have been confined to lands adjacent to rivers or lakes and mostly on river flood plains. Meteorological stations are also located along the rivers and lakes. Whether growing conditions on the uplands at higher altitudes and away from the possible ameliorating effects of the water would be as good is a matter of conjecture.

POTENTIAL FARM LAND

Estimates of the amount of potential farm land in the Northwest, even when based on the same information, may vary widely depending on what one considers to be farm land. Generally, there is a tendency to overestimate the resources in areas for which reliable information is scanty. With regard to land resources it is believed the most reliable figures can be obtained if we accept the rather strict standards adopted by our soil surveyors as to what constitutes arable land. Briefly, these standards, as applied to virgin areas, require a fairly fertile soil adaptable to a variety of crops, good topographical and drainage conditions, and reasonable freedom from stones. Lands which have inferior soils or which may have only grazing possibilities are not included as potential farm land.

Soil surveys, even of an exploratory nature, have only covered a relatively small portion of the total area of the Northwest. These surveys, however, have not only provided some definite information on certain important areas but as well have given some clues as to what may be encountered in areas not yet explored and the kind of land that may be considered to have agricultural possibilities in these northern regions.

The broad picture of potential agricultural lands in the Northwest can probably be best visualized if that area is divided into two regions; namely, the broad plain lying to the east of the Rocky and Mackenzie Mountains and the mountain and intermountain areas lying to the west of that plain.

THE PLAIN REGION EAST OF THE MOUNTAINS

This vast plain extends from the Athabaska River to the shores of the Arctic. The general slope of the land is toward the north, as is shown by the fact that this plain lies entirely within the Arctic watershed. The fact that the general elevation decreases toward the north is of considerable significance from an agricultural viewpoint, as the effect of higher latitudes is overcome to a considerable extent by lower altitudes. The

entire region has been glaciated, and the bedrock, in most places, is covered with a considerable depth of glacial drift. This drift is generally of intermediate to heavy texture, sands covering only relatively small areas.

The above statements would indicate that a large portion of this plain would be suitable for farming. There are, however, three conditions which greatly reduce the amount of possible arable land. First, there are some extensive ranges of hills in the region, which either are too rough for cultivation or have altitudes which result in danger from frosts every month of the year. Secondly, vast stretches of poorly drained land covered with muskeg occur in the region. Thirdly, the region lies in the grey wooded soil zone and the poorer or more severely leached soils of this zone are considered to be of doubtful value at the present time.

Notwithstanding the above conditions, there are large areas in the Northwest that have a sufficiently low elevation, and suitable enough topography and drainage and types of soil to justify their being regarded as desirable agricultural lands. No attempt will be made here to describe these desirable types of soil beyond stating that they consist of the better types of grey wooded soils together with a proportion of black or "parkland" soils.

The Upper Peace River

The Upper Peace River plateau, ranging in altitude from 2,200 to 2,500 feet, is the scene of a considerable agricultural development at the present time, the fame of which is well known. Results of preliminary soil surveys indicate, however, that a much greater development is possible, as it is estimated that besides the million acres already under cultivation there are at least 4,000,000 additional acres suitable for cultivation. It is true that the better lands have, to a large degree, already been occupied, but the remainder, on the whole, is as good virgin land as can be found in Canada.

The Fort Vermilion-Fort Nelson Plain

In northwestern Alberta and northeastern British Columbia lies a large plain with an elevation of 1,000 to 1,500 feet. Roughly this plain lies between the 58° and the 59° north latitude but extends to the 60° down the Hay and Nelson and Liard Rivers. The eastern limits of this plain may be set near Fort Vermilion with the western limits the foothills west of Fort Nelson.

The results obtained at the Experimental Sub-station at Fort Vermilion together with the experience of the few farmers in that district show clearly that

Right:—Young dairy stock on farm of Mr. A. Fournier, Dawson, Y. T. This is the only dairy farm in the Yukon Territory.

Bottom right:—River steamer lining up the Five Finger Rapids on the Lewes River near Carmacks, Y. T.

Below:—The three main projects of the United States Army in the north: the Highway (Alaska), the telegraph line (Catel), and the pipeline from Norman Wells (Canol). Between Teslin Lake and Whitehorse

on the eastern side of this plain all the common field and garden crops adapted for the Prairie Provinces can be successfully grown. Less information is available for the western side, but experience with garden crops and the weather records at Fort Nelson indicate the same story. From these observations it may be safely concluded that this entire plain is suitable for crop production where suitable soils are found.

That section of the Fort Vermilion-Fort Nelson plain lying east of the 118° west longitude, or 6th meridian, was explored by soil surveyors sent out by the Province of Alberta in 1930. A statement of their classification of lands in this area is of interest inasmuch as it not only shows that a large area of arable land exists in the Fort Vermilion area but also may serve as a type sample of the entire plain.

Some 4,678,000 acres surveyed in a preliminary manner were classified as follows:

*Parkland soils	37,000 acres	.8%
First class wooded soils	441,000 "	9.4%
Second " " "	2,106,000 "	45.0%
Third " " "	1,414,000 "	30.2%
Muskegs	555,000 "	11.9%
Eroded lands	49,000 "	1.0%
Lakes and rivers	76,000 "	1.7%

Considering only the first three classifications to be of agricultural value, there are in the eastern end of the plain some two and a half million acres of arable land, or 55 per cent of the total area surveyed.

Some information on soil conditions at the western or Fort Nelson end of the plain was obtained last summer during the course of an exploratory soil survey made by the Experimental Farms Service along the Alaska Military Highway. From Fort Nelson west to the foothills, a distance of some fifty miles, the Highway

*Unpublished reports, Department of Soils, University of Alberta

Top to bottom: —

Heavy clearing on the Alaska Military Highway south of Fort Nelson, British Columbia

White spruce in the valley of the Prophet River near Fort Nelson

Parkland in Takhini River valley west of Whitehorse, Y. T. Photo taken on July 5, 1943.

traverses an area of potential arable land. The soil generally is rather heavy in texture, and, while wooded, it has not been leached to any damaging extent. Since only the land along the Highway was examined, it is impossible to make any accurate estimate of the amount of possible arable land in the Fort Nelson area, but undoubtedly the acreage is a considerable one.

No information regarding soil conditions on the remainder of the Fort Vermilion-Fort Nelson plain is available. However, judging by what has been reported for the Fort Vermilion district and for the land west of Fort Nelson, it would appear that an estimate of about 6,000,000 acres of potential arable land would be reasonably conservative.

The Northwest Territories

Present agricultural development in the Northwest Territories is limited to a few farms and a number of gardens located along the Slave, Hay, Liard, and Mackenzie Rivers. The total area under cultivation probably does not exceed a thousand acres at present.

While gardens have been grown with fair success along the Mackenzie River, there is little information of how much land could be used for this or other farm purposes along that river. Probably the total acreage is small, as the land back from the river is reported to be poorly drained and mostly covered with muskegs which are permanently frozen to within a few inches of the surface.

Possibly the only sections where any agricultural settlement might be feasible lie in the valleys of the Slave, Hay and Liard Rivers. The land along the Liard would appear to offer some considerable promise, as much of this is really a continuation northward of the Fort Vermilion-Fort Nelson plain. Albright*, after reviewing available evidence, suggests that

*W. D. Albright, "Gardens of the Mackenzie", *Geographical Review*, Vol. XXIII, No. 1, Jan. 1933

Top to bottom:—

The broad, gravel-filled channel of the Duke River west of Whitehorse, Y. T.

Black poplar in the valley of the Prophet River near Fort Nelson

Flood plain along Muskwa River near Fort Nelson

the whole region of the Liard may be as favourable for cultivation as the Peace. No information, however, is available upon which to base even an estimate of the amount of possible farm land that lies in this area.

The foregoing remarks concern the main areas of possible arable land east of the mountains. In addition there are many small blocks of land suitable for cultivation in the area between the Athabaska and Peace Rivers, which, in the aggregate, would probably total about a million acres.

THE REGION WEST OF THE ROCKY AND MACKENZIE MOUNTAINS

Physiographically this region is markedly different from the region previously described. It is essentially a mountainous or hilly region, and, hence, areas of potential arable land are apt to be relatively small in size as compared with those found east of the mountains. There are, however, a few areas of possible farm land that reach a considerable acreage.

The Railway Belt in Central British Columbia

Most of the land along the railway from McBride to Hazelton has been soil-surveyed in recent years by the joint Dominion-Provincial parties. Information obtained for the surveyed area together with estimates of the unsurveyed portion show that there are approximately 1,000,000 acres of arable land in this part of British Columbia. Most of this land occurs on the plateaux around Prince George and Vanderhoof. Some settlement has taken place in this belt, some 50,000 acres being at present under cultivation.

Mountain Valleys

There are a number of mountain valleys in northern British Columbia that are reported to contain potential farm lands. The largest block of such lands appears to be in the Parsnip-Findlay Valley where there are reputed to be as many as 500,000 acres of arable land. From past experience, the true figure will probably be considerably lower when the area is soil-surveyed. How much arable land may occur in all these valleys is any one's guess, but it is doubtful if in the aggregate there is more than a million acres.

The Yukon

Since the exploratory soil survey conducted by us during the summer of 1943 only examined the lands along the more accessible routes of travel—that is, along the Alaska Highway and along the Lewes and Yukon Rivers from Whitehorse to Dawson and along the Stewart River from Mayo to Stewart—, a complete statement cannot be given for the Yukon. In the areas examined, totalling a linear distance of some 1,200 miles, about 200,000 acres had soils of sufficient quality to place them in the arable class. Over half this acreage lies in Takhini-Dezadeash Valleys west of Whitehorse, which are traversed by the Highway, while most of the remainder consisted of river flats along the Yukon River and its tributaries. Unfortunately, at the present time, no information is available on growing conditions in the valleys west of Whitehorse, although conditions appear promising as judged by the native vegetation and the character of the soils.

While only a relatively small portion of the Yukon was covered by the survey party, if would appear from other information that the more promising areas were seen. Possibly half a million acres would be a generous enough estimate of the total arable land in this territory.

SUMMARY

Present information indicates that there may be about fifteen million acres of arable virgin land in the area defined in this paper as Northwestern Canada. One-third of this area is serviced by existing railroads, while the remainder is largely inaccessible at the present time. These figures may be considered as conservative by some, as they do not include large areas of the poorer types of grey wooded soils. Spectacular success has been achieved in improving such types of soil south of the Athabaska River, but, until it has been demonstrated that such soils can be treated with equal success north of that river, where precipitation is more limited,

it appears advisable to consider them as being in a non-agricultural class.

The Development of Agricultural Lands

In time most of the better lands in Northwestern Canada will be farmed. Their development, however, will be slow as compared with the opening up of the prairies in the early years of this century. The wooded nature of these lands and their distance from railways will prevent any rapid development. This is not to be deplored, as it will permit an orderly settlement based on soil survey and other pertinent information to take place.

Immediate future development should be confined to those areas at present serviced by railways and to locations where a certain amount of agriculture would assist materially in the development of other natural resources. After the good vacant lands in the Upper Peace and the railway belt of central British Columbia are settled it will be time to consider the opening up of the large Fort Vermilion-Fort Nelson plain and the Parsnip-Findlay Valley for settlement. These areas are remote from established transportation routes at the present time, but they are not as remote as the Upper Peace was some thirty years ago.

Future Investigations

With its present population and outside markets Canada has no great need for more agricultural land. However, it requires no great imagination to see that all the good lands that can be economically developed will be required in the not-so-distant future. When that time comes, answers must be available for many questions if great wastage in human effort and in the natural resources is to be avoided.

More information is needed on the location, extent and types of soil. This can only be obtained by exploratory soil surveys followed by more detailed soil surveys of the better areas. Hand in hand with these investigations, there must be experiments on crops, cropping practices, and soil management. Then considerable effort should be devoted to finding more economical methods of land clearing.

Brief mention should be made of what is being done at present and what is proposed toward securing this necessary information. Some soil surveys have been conducted in the region, and it is hoped that after the war the present joint Dominion-Provincial soil surveys in Alberta and British Columbia can be expanded to a sufficient extent to be able to undertake vigorous programmes in the northern areas of those provinces. With regard to experimental work on crop production, the present Experimental Stations and Substations at Beaverlodge, Fort Vermilion, Prince George, and Smithers are providing much useful information. Some expansion in this direction is advisable, and, in the near future, the Experimental Farms Service hopes to establish two additional stations—one in the Yukon and the other in the Northwest Territories, probably in the valley of the Liard River. From all this work it should be possible in time to estimate accurately the potentialities for agriculture in the great Northwest.

Canadian Geographical Journal map

EDITOR'S NOTE-BOOK

Richard Redler, author of "How the Geopolitician Looks at the World", was born in Austria and studied at Austrian and Czechoslovakian as well as French universities, receiving the degree of LL.D. from the University of Innsbruck in 1931. Dr. Redler held several important positions with the Austrian Government prior to that country's annexation by the Germans in 1938. He passed through the prison of the Gestapo in Vienna and through a Vichy concentration camp at Le Vernet in formerly Unoccupied France before coming to Canada in the spring of 1941. In this country, Dr. Redler has lectured extensively for the Association of Canadian Clubs and the Institute of International Affairs, and is doing research work on European economic and financial problems, notably for the Bank of Canada.

Alphonse Olivier Dufresne, author of "Quebec—A Mineral Store", was born in Montreal in 1890. After taking the science course at Mount St. Louis College, he entered L'Ecole Polytechnique, University of Montreal, graduating as Mining Engineer in 1911. He then took a post-graduate course at McGill, which accorded him a Master of Science degree. In 1914 he joined the permanent staff of the Quebec Bureau of Mines as assistant Inspector of Mines, and was appointed Director in 1927. Mr. Dufresne assumed his present position, Deputy Minister of the Quebec Department of Mines, in 1941. He has served twice as Vice-President of the Canadian Institute of Mining and Metallurgy and several terms as Councillor, and is also a member of the Engineering Institute of Canada, the Quebec Corporation of Professional Engineers, and the American Institute of Mining and Metallurgical Engineers.

E. S. Archibald—See C. G. J. for October, 1940; February, 1944; April, 1944.

E. R. Yarham—See C. G. J. for June and October, 1939; June and September, 1942; April, 1943.

J. D. U. Ward—See C.G.J. for October, 1938, September, 1942.

CANADIAN
BANK NOTE COMPANY
LIMITED

Engravers of Securities

HEAD OFFICE
224 Wellington Street
OTTAWA

360 St. James West
MONTREAL

25 King St. West
TORONTO

AMONGST THE NEW BOOKS

The Hiker's Handbook by DOUGLAS LEECHMAN (W. W. Norton & Company, Inc., New York, N.Y. $2.50).

Whether you contemplate an afternoon ramble in the country or a cross-town hike in a busy city, a week-end holiday afoot in the neighbouring woods or a two-month walking tour in completely new territory, *The Hiker's Handbook* by Douglas Leechman is your guide to the complete enjoyment of your project.

Dr. Leechman is thoroughly familiar with his subject. For many years an enthusiastic hiker on three continents, he manages to pass on to his readers an appreciation of the very real joys to be experienced in a form of recreation that is annually increasing its devotees by thousands.

Complete and practical is the fund of information offered tyro and expert alike. The Introduction, reminding us that walking is man's normal method of travel (all other modes are artificial and of relatively recent origin), reviews the contributions that hiking can offer to our welfare, bodily and mental. One chapter is devoted to hints on walking. The other fifteen are all concerned with the broader subject of hiking: what to wear, how much equipment to take, how to carry it, where to sleep, finding one's way, keeping healthy, eating and drinking. The pleasures attendant upon specific forms of hiking are discussed at length, and the book closes with highly informative chapters on "Hiking Clubs and Associations" and "The Hiker and the Law".

While the newcomer to this interesting hobby will find the book a treasure-house of information that will answer his every question (and hundreds of unasked ones), the old-timer can learn from it all manner of tips about his favourite pastime. The cut of women's slacks, the use of gloves in cooking, a double boiler achieved with the help of a few pebbles, how to tell the man behind you at what time you left your last camping spot,—these are just a few of the numerous practical hints the manual offers. For good measure we have a special chapter on "Woodcraft and Trail Lore" to take in a number of details that do not fit conveniently into the other sections of the book. Where necessary, simple illustrations provide additional explanations.

The reader must feel grateful to the author for his habit of offering a scientific reason for some particular bit of lore, often quite casually and frequently with a touch of humour. So we learn the wisdom of wearing a hat in fly-time—it gives the mosquito a place to sit down. Hiccups are "spasmodic contractions on the diaphragm and can be cured by stretching that membrane". Lying down on a bed compresses it, thus reducing its insulating capacity—hence the need of more bedding beneath than above you. And some traditional beliefs are "debunked". The Eskimo laughs heartily (and with reason) at our idea of rubbing a frozen nose with snow. Nor does moss necessarily grow on the north side of a tree.

The Hiker's Handbook does more, though, than offer sound, practical advice; it challenges its readers to explore for themselves the possibilities of this enjoyable pastime. Time and again the author allows us glimpses of unexpected pleasures that hiking can give us. Many will accept the challenge.

E. Macfarlane

My Life with the Enemy by PHYLLIS ARGALL. (MacMillan Co., Toronto.....$3.50).

Miss Argall, who was born in Brandon, Manitoba, and, prior to her marriage was a Canadian citizen, spent her childhood in Japan, taught in a missionary school in Formosa, and in Tokyo, and later worked on and eventually edited the newspaper, *Japan-News-Week*, in Tokyo. She lived in Japan throughout those uncertain days when that country was secretly preparing for war, and on the outbreak of that war was arrested as a spy and sentenced to 18 months' imprisonment. She was returned to America with the first exchange of prisoners.

This outline of her own history is really an outline of the book as well. It is an entirely personal account of her life in Japan and of the extremely unpleasant experiences she passed through prior to and during her imprisonment. It is a very competent and workmanlike piece of writing, but Miss Argall seems to lack that peculiar flair for holding the interest that makes one reluctant to drop a book. She is to be highly complimented for the restraint with which she treats her own misfortunes, and for the courage with which she, through her newspaper, attempted to express her viewpoint, regardless of the reaction of the Japanese Government. A revealing book that shows the author's character in a very fine light, and a valuable record of the events preceding one of history's greatest examples of profound treachery.

P. E. P.

CANADIAN PRINT & LITHO

SPECIALISTS IN THE PRODUCTION OF CLASS MAGAZINES OF MEDIUM AND HIGH CIRCULATION.

Some of the Publications produced in our plant:

CANADIAN GEOGRAPHICAL JOURNAL
THE LEGIONARY
ROD AND GUN IN CANADA
FOREST AND OUTDOORS
MONTREAL FORUM SPORTS MAGAZINE
MONTREAL MEDICAL BULLETIN

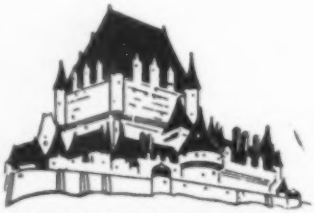
Also many house publications, some government publications, de luxe booklets of institutional character and certain classes of book printing.

We invite enquiries from responsible publishers who seek a printer possessing our unusual qualifications for publication printing. Our plant is complete all under one roof and includes art and editorial services.

CANADIAN PRINTING & LITHOGRAPHING COMPANY LIMITED

2151 ONTARIO ST. EAST - - MONTREAL, QUE.

Wartime Host from Coast to Coast



CHATEAU FRONTENAC
in Old Quebec

THE ROYAL YORK
Toronto

OTHER CANADIAN PACIFIC HOTELS

McAdam Hotel	McAdam, N.B.
Cornwallis Inn	Kentville, N.S.
Royal Alexandra Hotel	Winnipeg, Man.
Hotel Saskatchewan	Regina, Sask.
Hotel Palliser	Calgary, Alta.
The Empress Hotel	Victoria, B.C.
*Hotel Vancouver	Vancouver, B.C.

*Operated by the Vancouver Hotel Company, Ltd., on behalf of the Canadian Pacific and Canadian National Railways.

For Your Wartime Furlough... or Business Trip

A CORDIAL welcome . . . an assurance of efficient service in the traditional manner . . . await men and women in uniform . . . and wartime business travellers at the famous Canadian Pacific hotels. Located at strategic centres across the Dominion, these hostelries are designed for the comfort and convenience of their guests. Rates are moderate . . . for reservations write Hotel Managers.

Canadian Pacific Hotels